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भारतीय मानक

दूरदर्शन प्रसारण संचार के लिए रिसीवरों की मापन पद्धति

भाग 11 प्रसारण सिगनल मानक से भिन्न अवस्था के अन्तर्गत मापन

Indian Standard

METHODS OF MEASUREMENT ON RECEIVERS FOR TELEVISION BROADCAST TRANSMISSIONS

PART 11 MEASUREMENT UNDER CONDITIONS DIFFERENT FROM BROADCAST SIGNAL STANDARDS

UDC 621·397·132·125 : 621·317

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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Radio Communications Sectional Committee, LTD 20

NATIONAL FOREWORD

This Indian Standard, which is identical with IEC Pub 107-6 (1989) 'Recommended methods of measurement on receivers for television broadcast transmissions — Part 6 : Measurement under conditions different from broadcast signal standards', issued by the International Electrotechnical Commission was adopted by the Bureau of Indian Standards on the recommendation of the Radio Communications Sectional Committee (LTD 20) and approval of the Electronics and Telecommunication Division Council.

Wherever the words 'International Standard' appear, referring to this standard, they should be read as 'Indian Standard'.

In IEC Pub 107-6, some test methods have been described for all the three systems of colour transmission, namely, PAL, SECAM and NTSC systems. However, since in India, PAL System has been adopted for colour transmission, for the purpose of this Indian Standard only the test methods pertaining to 'PAL' system shall be applicable.

CROSS REFERENCES

International Standard	*Corresponding Indian Standard*
IEC Pub 107-1 (1977) Recommended methods of measurement on receivers for television broadcast transmissions — Part 1 : General considerations	IS 4545 (Parts 1 to 8) : 1983 Methods of measurement on receivers for television broadcast transmissions (Technically equivalent)
IEC Pub 107-2 (1980) Electrical measurements other than those at audio frequencies — Part 2 : Electrical and acoustic measurements and audio-frequencies	IS 4545 (Part 9) : 1983 Methods of measurement on receivers for television broadcast transmissions: Part 9 Electrical and acoustic measurements at audio frequencies (*first revision*) (Technically equivalent)

The technical committee responsible for the preparation of this standard has reviewed the provisions of the following International Publication and has decided that it is acceptable for use in conjunction with this standard:

IEC Pub 50 International electrotechnical vocabulary (I. E. V.).

Indian Standard

METHODS OF MEASUREMENT ON RECEIVERS FOR TELEVISION BROADCAST TRANSMISSIONS

PART 11 MEASUREMENT UNDER CONDITIONS DIFFERENT FROM BROADCAST SIGNAL STANDARDS

CHAPTER I: GENERAL

SECTION ONE — INTRODUCTION

1. Scope

This part of Publication 107 gives methods of measurement for television broadcast receivers under conditions in which the signal presented to the receiver is not in accordance with the specifications for broadcast signals adopted by the CCIR*. Such non-standard signals may be produced by video tape recorders, video disc players and television games, among other sources. Non-standard signal conditions which can also arise in normal reception of broadcast signals, for example due to propagation effects, are dealt with in Publication 107, Parts 1 and 2.

The methods of measurement given in this part are, where possible, based on the equivalent methods described in Publication 107, Parts 1 and 2, to which reference is required. However, the measurement conditions may be modified to accommodate the relevant non-standard input signals. This part is not concerned with specifying performance.

2. Object

This part of Publication 107 specifies methods of measurement for those characteristics of broadcast television receivers using existing technology which have been found, by experience of the nature of signals produced by existing types of ancillary equipment and systems, to be significant in determining their mutual compatibility.

It is not possible to predict the nature of signals which may be produced by equipment of new design or that uses new technology, nor the relevant characteristics of new types of receiver.

This part of the standard, therefore, does not imply that any aspect of receiver performance, determined by the specified methods of measurement, will ensure compatibility between a receiver and a given source of signals not complying with the relevant broadcast standard.

SECTION TWO — EXPLANATION OF TERMS

3. Definitions

The following definitions apply for the purpose of this standard:

* CCIR: International Radio Consultative Committee.

3.1 *Inaccuracy*

A condition different from the rated or standard conditions of frequency, level or modulation factor, etc.

3.2 *Fluctuation*

A fluctuating condition of frequency, level, etc. over time from the reference value.

4. Standard measuring conditions

Unless otherwise stated, all measurements shall be carried out under the conditions specified in IEC Publications 107-1 and 107-2. The standard measuring conditions, referred to in this part, are those described in Publication 107-1, Sections Eight, Nine and Ten. For certain measurements, input levels other than -50 dB (mW) may be used.

CHAPTER II: NON-STANDARD SIGNAL CONDITIONS AFFECTING THE TUNER, VIDEO I.F. AND SOUND CHANNEL

SECTION THREE — TUNING RANGE ACCOMMODATION FOR NON-STANDARD CARRIER FREQUENCIES

5. Introduction

The tuning range is the range of the operating frequency over which the fine tuning mechanism is capable of adjustment. The measurement is primarily of interest for step tuning systems. For some automatic tuning systems the measurement is not applicable.

6. Method of measurement

The receiver shall be put under standard measuring conditions with an input signal modulated by a test pattern (see IEC Publication 107-1, Sub-clause 3.16).

When the receiver is equipped with an automatic local oscillation frequency control circuit, the circuit shall be made inoperable, when possible (see note). The local oscillation frequency shall then be measured and the measurement repeated when the fine tuning control is positioned at its upper and lower limits.

Note. — Some receivers incorporate a.f.c. which cannot be disabled without seriously affecting the operation of the local oscillator.

7. Presentation of results

The results are tabulated by obtaining, for each tuning frequency, the difference between the oscillation frequency at the tuned point and the oscillation frequencies at the two extreme points of the fine tuning control setting. The differences are expressed using plus and minus signs.

SECTION FOUR — SELECTIVITY WITH OFFSET PICTURE CARRIER FREQUENCY

8. Introduction

The carrier frequencies, from non-broadcast sources, may be offset by amounts up to about 2 MHz from the standard frequency.

Theoretically, continuous tuning systems should be able to accept the offset but step tuning systems may not.

This measurement aims to check the variation when an offset picture carrier frequency signal is applied to the receiver. The variation is shown by measuring the single-signal selectivity.

9. **Method of measurement**

The single-signal selectivity shall be measured as described in Publication 107-1, Section Forty-nine, on a representative number of channels.

The measurement is made at the standard input frequency and at ±2 MHz from this frequency.

10. **Presentation of results**

The frequency response is plotted as a curve having a 0 dB reference level at the picture carrier frequency. The responses at the adjacent picture and sound carrier frequencies are also shown.

An example of single-signal selectivity is shown in Figure 1.

SECTION FIVE — VIDEO BEAT INTERFERENCE DUE TO INACCURATE SOUND CARRIER FREQUENCY

11. **Introduction**

Home video equipment in general contains an r.f. converter. The frequency spacing between the picture and sound carriers may differ from that of the broadcast standard.

This measurement measures the beat interference in luminance and chrominance signals due to inaccurate frequencies.

12. **Method of measurement**

The receiver shall be put under standard measuring conditions with a television signal modulated by a colour bar pattern applied to the input.

The sound modulation shall be set to zero and the sound carrier frequency varied above and below the standard frequency. The frequencies at which beat interference is just visible on the picture shall be noted. The measurement shall be repeated with a sound signal of 80% modulation or deviation, at 1 kHz.

A representative number of channels shall be measured as recommended in Publication 107-1, Sub-clause 3.22.

If a full evaluation of multiple-signal selectivity is required, reference should be made to Publication 107-1, Section Fifty.

13. **Presentation of results**

The results shall be tabulated, as shown in Table I, page 55, with the types of interference and shifted frequency values mentioned.

SECTION SIX — VIDEO BEAT INTERFERENCE DUE TO NON-STANDARD PICTURE-TO-SOUND RATIO

14. **Introduction**

There are many sources of television signal that have vision-to-sound carrier level ratios that differ from the local broadcasting standard. In some community antenna systems, the sound carrier level changes within the system due to non-linearities of frequency response.

When the sound carrier level is low the audio signal-to-noise ratio is reduced, while a higher level may cause beat patterns to appear on the picture.

This measurement determines the capability of the receiver to accommodate such signals.

15. **Method of measurement**

The receiver shall be put under standard measuring conditions with a television signal modulated by a colour bar pattern applied to the input. The input signal available power level shall be −40 dB (mW) unless otherwise stated. The sound carrier shall be 30% modulated at 1 kHz.

The picture shall be observed for beats while the picture-to-sound ratio is varied.

Note. — The input signal level is set at −40 dB (mW) because the measured values fluctuate greatly when A.G.C. operation starting-point is at the input signal level of −50 dB (mW).

16. **Presentation of results**

The type of interference and the picture-to-sound ratio at which this interference becomes just visible shall be recorded.

SECTION SEVEN — EFFECT OF SIGNAL LEVEL FLUCTUATION ON THE A.G.C.

17. **Method of measurement**

The receiver shall be measured using the method described in Publication 107-1, Sections Forty-one and Forty-two.

SECTION EIGHT — PRIMARY COLOUR CHANNEL AMPLITUDE FLUCTUATION

18. **Method of measurement**

The measurement method described in Publication 107-1, Section Forty-four shall be used.

SECTION NINE — SOUND DISTORTION DUE TO INACCURATE SOUND CARRIER FREQUENCY

19. **Method of measurement**

The receiver shall be put under the standard measuring conditions with a television signal modulated by a test pattern applied to the input. Sound modulation shall be adjusted to 80% modulation or deviation at 1 kHz and the receiver volume control set to obtain a reference audio output (see Publication 107-2, Section Four). The shifted values of the sound carrier frequency at which sound distortion becomes 10% shall be measured. The measurement shall be carried out on the representative number of channels listed in Publication 107-1, Sub-clause 3.22.

20. **Presentation of results**

The frequencies at which the distortion becomes 10% shall be stated (see Table I, page 55).

SECTION TEN – SOUND OUTPUT AND SIGNAL-TO-NOISE RATIO AS A FUNCTION OF PICTURE-TO-SOUND RATIO

21. Method of measurement

The receiver shall be put under the standard measuring conditions with a television signal modulated by a test pattern applied to the input.

The input signal shall be set at -40 dB (mW).

The picture-to-sound ratio shall be the standard value for the relevant system. Both the sound output and the noise output, obtained when the sound modulation is switched off, shall be measured (see Publication 107-2, Clause 61).

The same measurement shall then be made using different picture-to-sound ratios on a representative number of channels (see Publication 107-1, Sub-clause 3.22).

Note. – The input signal level is set at -40 dB (mW) because the measured values fluctuate greatly when A.G.C. operation starting-point is at the input signal level of -50 dB (mW).

22. Presentation of results

The results of the measurement shall be presented graphically. The picture-to-sound ratio shall be plotted on the abscissa, and the signal-to-noise ratio on the ordinate, both in decibels. An example is shown in Figure 2.

SECTION ELEVEN – SOUND SIGNAL-TO-NOISE RATIO IN RELATION TO PICTURE MODULATION FACTOR

23. Introduction

In some home video tape recorders, the simplified television signal generator delivers output at a picture modulation factor different from the broadcasting standard. Many of them produce the output at a lower picture modulation factor, but sometimes they deliver overmodulated output due to variation of the picture modulation factors.

This measurement determines the signal-to-noise ratio of sound in relation to the picture modulation factor.

24. Method of measurement

The receiver shall be put under standard measuring conditions with inputs of a white video signal (see Publication 107-1, Sub-clause 3.2) as the picture modulation, and 100% (FM) or 80% (AM) modulation factors for the sound channel. The sound signal output is measured for reference. Next, the sound modulation is switched off and the noise level measured (see Publication 107-2, Clause 61).

Then the sound signal-to-noise ratio is measured at different picture modulation factors.

25. Presentation of results

The results shall be presented graphically as shown in Figure 3. The signal-to-noise ratio shall be plotted on the ordinate in decibels and the picture modulation level shall be plotted on the abscissa in percentage.

SECTION TWELVE – SOUND DISTORTION DUE TO INACCURATE SOUND MODULATION FACTOR

26. Introduction

In some home video tape recorders, the r.f. converter delivers the output at a sound modulation factor different from the broadcasting standard. The generator, for example, sometimes delivers an instantaneous 200% overmodulation in FM modulation.

This measurement determines sound distortion due to overmodulation of the sound carrier.

27. Method of measurement

The distortion shall be measured while increasing the sound modulation factor up to 200% in FM modulation and up to 80% in AM modulation, or until the distortion exceeds 10%. The measurement shall be repeated with 5 kHz modulation frequency.

The distortion measurement is described in Clause 40, Sub-clause 41.2 and Clause 42 of Section Twelve of Publication 107-2.

CHAPTER III: INACCURACIES AFFECTING THE SCAN SYNCHRONIZATION PERFORMANCE AND RELATED FUNCTIONS

SECTION THIRTEEN – LINE SYNCHRONIZATION CATCH AND HOLD RANGE

28. Introduction

On some household video equipment, the synchronizing frequencies may deviate from the broadcast signal standard. This measurement examines the catch and hold range of line synchronization.

29. Method of measurement

The receiver shall be measured according to Publication 107-1, Clause 93, using the method given in paragraph 3.

SECTION FOURTEEN – HORIZONTAL DISPLACEMENT DUE TO INACCURATE LINE SYNCHRONIZING SIGNAL FREQUENCY

30. Introduction

The measurement measures the horizontal displacement of the picture, due to phase error in the line synchronizing signal, when the receiver is synchronized.

31. Method of measurement

The receiver shall be measured according to the method described in Publication 107-1, Clause 98, starting with the line scan frequency at its standard value. The line frequency is then shifted up and down to determine the displacement as a function of frequency.

32. Presentation of results

The displacement, with inaccurate line scan frequency, is expressed in terms of the portions of the left or right hand edges of the picture that are missing or folded as a percentage of picture width (see Publication 107-1, Clause 98 and Figure 17c).

SECTION FIFTEEN – PICTURE DISTORTION DUE TO INACCURATE LINE SCAN FREQUENCY

33. Method of measurement

The measurement of synchronizing quality is dealt with in Publication 107-1, Chapter IV, for normally encountered operating conditions, but anomalous effects may occur with larger errors in the line scan frequency.

Observations shall be made, during the measurement described in Clause 31, of any significant changes in the picture size and geometry, the appearance of retrace lines or a turnup pattern, or degradation of the convergence.

34. Presentation of results

The observed phenomena, caused by inaccurate line scan frequency, shall be recorded.

SECTION SIXTEEN – BENDING DUE TO INACCURATE LINE SCAN FREQUENCY

35. Method of measurement

If the upper part of the picture curls left or right (bending) during the observations described in Clauses 31 and 33, this shall be noted separately.

36. Presentation of results

The top curl corresponding to the shift in the line scan signal frequency shall be recorded.

SECTION SEVENTEEN – LINE PHASE FLUCTUATION DUE TO LINE SIGNAL FREQUENCY FLUCTUATION

37. Introduction

In some devices, such as home video tape recorders, the head drum mechanism, tape drive mechanism, or tape distortion causes fluctuation in the time base. Such fluctuation is referred to as "jitter". A measurement is taken in order to determine the capability of the receiver to compensate for such a time base fluctuation (see also Publication 107-1, Chapter VIII).

38. Method of measurement

The measurement circuit is composed as in Figure 4. The receiver shall be put under the standard measuring conditions with a television signal modulated by a positive grill pattern (see Publication 107-1, Sub-clause 3.16 and Clause 79) applied to the input.

The line synchronizing control of the receiver shall be adjusted to the optimum position when supplied with a standard signal. The input video signal shall be applied to the Y-axis of

an oscilloscope and the horizontal output pulse shall be applied to the external trigger input of the oscilloscope.

The line synchronizing signal frequency of a television signal generator is then frequency-modulated by a low frequency sine wave signal. The modulation frequency shall be varied between approximately 1 Hz and 5 kHz, the deviation being insufficient to cause loss of line synchronization. Using the oscilloscope, the peak-to-peak value of the time fluctuation, ΔT, of the horizontal synchronizing signal, is measured as a percentage of the horizontal scanning time *TH*.

39. **Presentation of results**

The results of the measurement shall be presented graphically. The ratio of the maximum frequency fluctuation (Δf) to the line synchronizing frequency (fH) gives an input frequency fluctuation ratio ($\Delta f/fH$). The ratio of the peak-to-peak value of the time fluctuation (ΔT) to one horizontal period (TH) gives an output line phase fluctuation ratio ($\Delta T/TH$). The ratio of the output line phase fluctuation ratio to the input frequency fluctuation ratio gives a line phase fluctuation coefficient:

$$\frac{\Delta T/TH}{\Delta f/fH}$$

The modulation frequency shall be plotted on the abscissa using a logarithmic scale and the line phase fluctuation coefficient shall be plotted on the ordinate using a logarithmic scale (see Figure 5).

SECTION EIGHTEEN — HORIZONTAL POSITION FLUCTUATION DUE TO LINE PHASE FLUCTUATION

40. **Method of measurement**

The same method of measurement as in Clause 38 is used. However, a video signal generator of the count-down type is needed. This type of generator provides a video signal with the property that all time intervals are related to an external or internal clock frequency and are therefore substantially free from jitter. The peak-to-peak value of the jitter (ΔW) of the central vertical line of the grill pattern (see Publication 107-1, Clause 79) shall be measured while the modulation frequency is shifted as in Clause 38 (see also Publication 107-1, Section Twenty-three).

41. **Presentation of results**

The line phase fluctuation ratio ($\Delta T/TH$) is obtained as described in Clause 38. The ratio of the jitter (ΔW) and the horizontal period width (WH) (which is impossible to measure directly, but can be calculated from the grill interval) gives a horizontal fluctuation ratio ($\Delta W/WH$).

The ratio of the horizontal position fluctuation ratio and the horizontal phase fluctuation ratio gives a horizontal position fluctuation coefficient:

$$\frac{\Delta W/WH}{\Delta T/TH}$$

The modulation frequency shall be plotted on the abscissa, using a logarithmic scale, and the horizontal position fluctuation coefficient shall be plotted on the ordinate, using a logarithmic scale (see Figure 6).

SECTION NINETEEN — PHASE STEP RESPONSE

42. Method of measurement

The measurement circuit is shown in Figure 7. A video signal containing a positive vertical line as well as the synchronizing signal shall be delayed by approximately 6 µs for 525 line and 15 µs for 625 line systems. The delayed signal and the original signal shall be switched at the middle of each field to produce a test signal, which is applied to the receiver. A Y-shaped response appears on the receiver screen as shown in Figure 8. The time (*T*), between the start of the phase step and the point at which the *B*/*A* ratio of Figure 8 has fallen to 10%, shall be measured in terms of the number of horizontal lines occurring during this period. When the waveform has overshoot, the *B*/*A* ratio is determined from the envelope of the curve as shown in Figure 8b.

Note. — The positive vertical line should have a rectangular waveform, with a duration of 0.7 µs.

43. Presentation of results

The number of horizontal lines between the start of the phase step and the point at which the *B*/*A* ratio has fallen to 10% shall be recorded.

SECTION TWENTY — VERTICAL SYNCHRONIZATION CATCH AND HOLD RANGE

44. Method of measurement

The receiver is put under standard measuring conditions with a television signal modulated by a positive grill pattern (see Publication 107-1, Sub-clause 3.16 and Clause 79). The frequency of the vertical synchronizing signal, from a generator, is then slowly shifted up or down and the frequencies at which synchronization is lost are noted (hold range). The generator frequency is then moved slowly back towards standard frequency until synchronization is regained (catch range). Any vertical movement of the picture or change in vertical amplitude shall be noted (see Publication 107-1, Clause 100).

Note. — The catch and hold range may considerably exceed the adjustment range of the television signal generator and the frequency error conditions likely to be met in practice.

45. Presentation of results

The frequencies of the catch range and the hold range shall be recorded. If synchronization was not lost during the measurement, this shall be noted and the frequency range over which the tests were made shall be recorded.

SECTION TWENTY-ONE — PICTURE DISTORTION DUE TO INACCURATE VERTICAL SCAN FREQUENCY

46. Method of measurement

The procedure of Clause 44 is followed, but the vertical scar frequency is kept within the hold range.

47. **Presentation of results**

Any anomalous phenomena shall be recorded, such as vertical fluctuation of the picture, or the appearance of retrace lines.

SECTION TWENTY-TWO — EFFECTS DUE TO NON-STANDARD VERTICAL SYNCHRONIZING SIGNAL

48. **Introduction**

In some home video tape recorders, the width of the vertical synchronizing signal can be quite large when a still picture is played back. On the other hand, some home computers and video games deliver a vertical synchronizing signal that is narrower or without equalizing pulses.

This measurement determines if there are unstable vertical synchronizing characteristics, up or down displacement of the picture, or distortion at the top of the picture which is often referred to as "flagging" (see also Publication 107-1, Chapter VIII).

49. **Method of measurement**

The receiver shall be put under the standard measuring conditions with a television signal modulated by a test pattern applied to the input (see Publication 107-1, Sub-clause 3.16).

The synchronization range shall be measured with a vertical synchronizing signal consisting of a single broad pulse. The front edge of the pulse is positioned at the front edge of a standard vertical synchronizing signal (see Figure 9) but the position of the back edge is varied between $-1\ H$ and $+15\ H$ from normal.

The picture on the receiver shall be checked for anomalous phenomena.

50. **Presentation of results**

The width (H) of the vertical synchronizing signal at which the picture is affected shall be recorded.

Note. — In practice, more deviation from the standard can occur, particularly on the still frame mode. For example, the vertical synchronizing pulse may start early.

SECTION TWENTY-THREE — DISTURBANCE OF SYNCHRONIZATION DUE TO INACCURATE SYNCHRONIZING SIGNAL LEVEL

51. **Introduction**

There are some cases in which video systems produce a synchronizing signal level which is different from the local broadcasting standard.

This measurement determines the effects of an inaccurate synchronizing signal level on the synchronizing separation, d.c. restorer, and burst gate circuits of the receiver.

52. **Method of measurement**

These measurements shall be carried out with a range of video synchronization signal ratios using the methods described in Publication 107-1, Chapter IV.

SECTION TWENTY-FOUR – INACCURATE CONTRAST AND BLACK LEVEL DUE TO INACCURATE SYNCHRONIZING SIGNAL LEVEL

53. Method of measurement

The receiver shall be put under the standard measuring condition and provided with an input signal having positive-vertical bars as shown in Figure 10 for picture modulation. An oscilloscope is d.c.-coupled to the blue-cathode of the picture tube to measure the voltage between the black level and the white level (see also Publication 107-1, Sections Sixty-three and Sixty-four).

The variation of the picture amplitude and black level shall be measured by changing the synchronizing signal level.

54. Presentation of results

The results of the measurement shall be presented graphically as in Figure 11. The ratio of the picture amplitude (V_2/V_1) and the black level to reference level ($\Delta V/V_1$) is plotted in percentage on the ordinate. Inaccurate signal to reference signal ratio is plotted on the abscissa in decibels.

SECTION TWENTY-FIVE – INACCURATE CONTRAST AND BLACK LEVEL DUE TO INACCURATE SET-UP INTERVAL – NTSC SYSTEM

55. Introduction

Unlike the PAL system, it is specified that the reference black level in the NTSC signal is to be separated from the blanking level by a setup interval which shall be (7.5 ± 2.5)% of the video range from blanking level to reference white level. In practice, the setup interval varies anywhere from 0% to 15% of the video range from blanking level to reference white level. On occasion, it has been observed to fall below blanking level.

56. Method of measurement

The receiver shall be put under standard measuring conditions and provided with an input signal having positive vertical bars as shown in Figure 12 for picture modulation. An oscilloscope is d.c.-coupled to the blue-cathode to measure the change in black level and the voltage between black level and reference white level.

Variations in picture amplitude and black level are measured by changing the setup interval such that it varies below and above its nominal value within the following limits:

1) Below blanking level, in the direction of sync, by an interval that is 10% of the video range between blanking level and white level.

2) Above blanking level, towards white level, by an interval that is 20% of the video range between blanking level and white level.

The amplitude difference between blanking level and white level shall be kept constant by observing the waveform on a high-frequency oscilloscope or spectrum analyzer.

57. **Presentation of results**

The results of the measurements shall be depicted as curves as in Figure 13. The ratio of the picture amplitude (V_2/V_1) and the black level to reference level ($\Delta V/V_1$) is plotted in percentage on the ordinate. Inaccurate setup interval to reference is plotted on the abscissa in decibels.

CHAPTER IV: INACCURACIES AFFECTING THE CHROMA CIRCUITS

SECTION TWENTY-SIX — HUE VARIATION DUE TO INACCURATE CHROMINANCE SUBCARRIER SIGNAL FREQUENCY — NTSC SYSTEM

58. **Introduction**

Various methods are available to generate chrominance subcarrier signals for home video equipment and their frequencies are sometimes different from broadcasting standards.

This measures the response of the hue of the receiver due to the inaccurate chrominance subcarrier signal frequencies.

59. **Method of measurement**

The measurement setup is given in Figure 14a. The receiver shall be put under the standard measuring conditions with a television signal modulated by a colour bar signal applied to the input (see Publication 107-1, Sub-clause 3.16). The colour demodulator output signals R-Y and B-Y of the receiver shall be applied to an X-Y oscilloscope which shall be adjusted so that the indication appears in the correct position.

Note. — In some receivers it is not possible to adjust the oscilloscope in this way. This is the case if the R-Y and B-Y signals are not demodulated at an angle of exactly 90° with respect to each other.

The following procedure can then be followed: apply a TV signal modulated with a video signal as in Figure 14b. The video signal has a frequency close to the subcarrier frequency but is not locked to it. The oscilloscope should be adjusted so that the R-Y and B-Y axes are equal (see Figure 14c). If the colour demodulation axes are under 90° a circle appears; if not an ellipse.

If the colour difference signals R-Y and B-Y are not available, the colour signals R and B can be used if the luminance component is made constant during the horizontal period (see Figure 15). Colour saturation shall be at the standard level.

Next, the phase shift of the red colour in relation to the colour burst shall be noted.

The representative number of channels listed in Publication 107-1, Sub-clause 3.22, shall be measured.

60. **Presentation of results**

The results of the measurement shall be plotted on a graph, with the shifted frequencies (MHz) on the abscissa, and the degree of phase shift on the ordinate. When the phase shifts at each point show different values, these values shall be shown on the graph in the same way (see Figure 16).

SECTION TWENTY-SEVEN — PICTURE QUALITY VARIATION DUE TO INACCURATE CHROMINANCE SUBCARRIER SIGNAL FREQUENCY — PAL SYSTEM

61. Method of measurement

For a full investigation, measurements according to Publication 107-1, Sections Sixty-eight, Sixty-nine and Seventy-five shall be made at several subcarrier frequencies within ±10% of the standard value.

62. Presentation of results

See the relevant sections, mentioned above, of Publication 107-1.

SECTION TWENTY-EIGHT — HUE VARIATION DUE TO INACCURATE CHROMINANCE SUBCARRIER SIGNAL FREQUENCY — SECAM SYSTEM

63. Introduction

The SECAM system uses frequency modulation of two subcarriers for colour transmission. Consequently, SECAM is sensitive to inaccurate chrominance subcarrier signal frequency.

However, some television receivers use the reference signal at the beginning of the line to reduce the effect of this inaccuracy. This measurement is to determine the hue variation of the receiver.

64. Method of measurement

The receiver shall be put under the standard measuring conditions, with a television signal modulated by a colour bar signal to the input (see Publication 107-1, Sub-clause 3.16). The control subcarrier frequencies shall be variable.

The voltage shifts of the R-Y and B-Y signals shall be measured for different values of f_0r and f_0b respectively. These values shall be normalized by dividing by the voltage V (see Figures 17 and 18). The normalized values are known as relative shifts.

65. Presentation of results

The results of the measurement shall be plotted on two graphs (one for R-Y and another for B-Y), with the relative shifts on the abscissas and the hue variations on the ordinates (see Figure 19).

SECTION TWENTY-NINE — COLOUR SYNCHRONIZATION CATCH AND HOLD RANGE — NTSC AND PAL SYSTEMS

66. Method of measurement

The measurement shall be conducted as described in Clause 59, except that the frequency at which colour synchronization is established, as the colour subcarrier frequency is varied towards its standard value, shall be recorded.

These frequencies are the limits of the catch range. The frequencies at which colour synchronization is lost as the colour subcarrier frequency is varied away from its standard value shall also be recorded. These are the limits of the hold range.

67. Presentation of results

The results of the measurement are shown as the shifted frequency values. If the colour killer operates before synchronization fails, this shall be stated.

SECTION THIRTY – COLOUR SYNCHRONIZATION CATCH AND HOLD RANGE – SECAM SYSTEM

68. Introduction

The SECAM system uses two different subcarriers for colour transmission. At the beginning of each line a special burst is transmitted, with frequency of 4.406 25 MHz if the line contains the information R-Y, or 4.250 00 MHz if the line contains the information B-Y.

Receivers identify colours by using the difference between these two frequencies. So, to measure colour synchronization catch and hold range, it is necessary to measure the shift when the two frequencies are shifted simultaneously, and then shift again when each frequency is shifted individually.

69. Method of measurement

The measurement shall be carried out in the same way as described in Clause 64. The result is a difference between the accurate values of $f_0 r$ and $f_0 b$ and the values of these parameters when colour synchronization is lost. After each alteration of the frequencies, $f_0 r$ and $f_0 b$, the r.f. signal shall be interrupted for a short time so that the receiver goes out of synchronization.

First case:

Simultaneous variations of $f_0 b$ and $f_0 r$
+ for increase
– for decrease

Second case:

Independent variations of $f_0 b$ and $f_0 r$

$f_0 b$	$f_0 r$
Fixed	Increase (+)
Fixed	Decrease (-)
Increase (+)	Fixed
Decrease (-)	Fixed

70. Presentation of results

The results of the measurement shall be expressed in a table showing the different cases of catch and hold for colour synchronization.

SECTION THIRTY-ONE – HUE FLUCTUATION DUE TO CHROMINANCE SUBCARRIER FREQUENCY FLUCTUATION – NTSC SYSTEM

71. Introduction

In some devices, such as home video tape recorders, the head drum mechanism, tape drive mechanism, or tape distortion causes fluctuation in the time base. Such fluctuation is referred to as "jitter". A measurement is taken in order to determine the capability of the receiver to compensate for the effect on hue reproduction of such a time base fluctuation (see also Publication 107-1, Chapter VIII).

72. Method of measurement

Measuring conditions are the same as in Clause 59. The frequency of the colour subcarrier generator shall then be frequency modulated by a low frequency sine wave signal. The frequency deviation shall be adjusted so that the receiver is not out of colour synchronization. The peak-to-peak value of the phase fluctuation shall be measured as a function of the modulation frequency over the range 1 Hz to 2 kHz.

73. Presentation of results

The results of the measurement shall be presented graphically. The ratio of the maximum frequency deviation (Δf) to the colour subcarrier frequency (fsc) gives an input frequency fluctuation ratio ($\Delta f/fsc$). The peak-to-peak value of the phase fluctuation ($\Delta \varphi$) divided by 2π gives a phase fluctuation ratio ($\Delta \varphi/2\pi$). The ratio of the output phase fluctuation ratio to the input frequency fluctuation ratio:

$$\frac{(\Delta \varphi / 2\pi)}{(\Delta f / fsc)}$$

gives a hue fluctuation coefficient.

The modulation frequency shall be plotted on the abscissa, using a logarithmic scale, and the hue fluctuation coefficient shall be plotted on the ordinate, using a logarithmic scale (see Figure 20).

SECTION THIRTY-TWO – COLOUR SYNCHRONIZATION CHARACTERISTICS – NTSC AND PAL SYSTEMS

74. Method of measurement

In the same manner as described in Clause 72, the instantaneous chrominance subcarrier frequency at the point where colour synchronization is lost shall be measured by increasing the deviation of the chrominance subcarrier generator at each modulation frequency until synchronization is lost.

75. Presentation of results

The results of the measurement shall be presented graphically. The maximum frequency deviation (Δf) and the colour subcarrier frequency (fsc) form an input frequency fluctuation ratio ($\Delta f/fsc$). The modulation frequency shall be plotted on the abscissa, using a logarithmic scale, and the input frequency fluctuation ratio shall be plotted on the ordinate, using a logarithmic scale (see Figure 21).

SECTION THIRTY-THREE — INACCURATE CHROMINANCE SUBCARRIER LEVEL INCLUDING REFERENCE BURST SIGNALS — NTSC AND PAL SYSTEMS

76. Introduction

There are some cable television systems and household video systems that have chrominance subcarrier signal levels different from the broadcasting standard. This is caused by effects of the S.W.R. of the systems or frequency responses of the amplifier(s).

This measurement measures the colour A.G.C. characteristics of the receiver when the chrominance level is varied.

77. Method of measurement

The measurement method is the same as described in Sections Forty-three and Forty-five of Publication 107-1.

78. Presentation of results

The subcarrier amplitude, with reference to the nominal amplitude, shall be plotted on the abscissa using linear scale in decibels, and the colour signal output, with reference to that obtained under standard measuring conditions shall be plotted on the ordinate using a linear scale in decibels (see Figure 22).

SECTION THIRTY-FOUR — INACCURATE CHROMINANCE SUBCARRIER LEVEL INCLUDING IDENTIFICATION SIGNAL — SECAM SYSTEM

79. Introduction

The SECAM system does not use colour A.G.C. like the NTSC and PAL systems. This is because the frequency modulation of the subcarrier for transmission in the SECAM system is less sensitive to subcarrier amplitude than the other systems and the decoding circuit usually has a limiter.

Therefore, colour A.G.C. characteristics need not be obtained for SECAM systems. Only the chrominance subcarrier levels at which the colour difference signal disappears, or the line identification malfunctions, are necessary. In several cases, disturbances may occur in the vicinity of colour transitions. The appropriate level at which such effects are observed shall be noted with the results.

80. Method of measurement

The receiver shall be put under the standard measuring conditions with a television signal modulated by a colour bar signal applied to the input (see Publication 107-1, Sub-clause 3.16).

Maintaining the luminance signal level, the chrominance subcarrier signal level shall be varied. By observing the colour bar pattern while interrupting the r.f. signal for a short time so that the receiver goes out of sync, the chrominance subcarrier signal level at which the colour of the colour bar disappears or line identification malfunctions shall be determined (see Publication 107-1, Section Forty-five).

81. Presentation of results

Using the standard chrominance subcarrier signal level as the reference value, the difference between the chrominance subcarrier signal level, at which the colour of the colour bar disappears or line identification malfunctions, and the reference value shall be presented in decibels.

SECTION THIRTY-FIVE – COLOUR OUTPUT CHANGE DUE TO INACCURATE REFERENCE BURST SIGNAL LEVEL – NTSC AND PAL SYSTEMS

82. Introduction

In some video tape recorders and home colour cameras, the reference burst signal level differs from the broadcasting standard. In receivers, colour synchronization is established by the burst signal and colour A.G.C. operates by detecting the reference burst signal level. Therefore, a change in the burst signal level leads to changes in saturation and in the case of NTSC in hue. Consequently, the deviation of burst signal from its standard level should be minimized.

83. Method of measurement

The receiver shall be put under standard measuring conditions with a television signal modulated by a colour bar signal applied to the input (see Publication 107-1, Sub-clause 3.16).

Where the receiver uses colour difference drive, the output voltage of the B-Y colour difference signal shall be measured while varying the reference burst signal level from the signal generator. Where the receiver uses primary colour drive, the output voltage of the B primary signal shall be measured instead of the B-Y signal.

84. Presentation of results

The results of the measurement shall be presented as shown in Figure 23. The output voltage ratio is the ratio of the output voltage, expressed in decibels, referred to the standard ouput voltage. The burst signal level difference shall be plotted on the abscissa in decibels and the output voltage level on the ordinate in decibels.

Note. – Figure 23 does not reflect the characteristic of NTSC receivers employing both burst and chrominance A.G.C. if the chrominance A.G.C. is not made to be inactive.

SECTION THIRTY-SIX – RANGE OF COLOUR SATURATION ADJUSTMENT – NTSC AND PAL SYSTEMS

85. Method of measurement

The receiver shall be put under standard measuring conditions with a television signal modulated by a colour bar signal applied to the input (see Publication 107-1, Sub-clause 3.16).

If the receiver uses a colour difference drive, the B-Y colour difference signal output shall be measured when the burst signal level of a signal generator is in the standard condition. The measured value shall be E_0.

If the receiver uses a primary colour drive, the blue colour signal output shall be measured when the burst signal level of a signal generator is in the standard condition. The measured value shall be E_0.

As the reference burst signal level is varied, the colour saturation adjuster shall be adjusted to correct the output voltage to be E_0.

When it is impossible to correct the output voltage with the colour saturation adjuster, the output voltage shall be set as close as possible to E_0 and the output voltage shall be noted. If the hue changes or colour synchronization is lost, the symptom shall be clearly recorded.

86. Presentation of results

The results of the measurement shall be presented graphically as shown in Figure 24. The ratio of the blue primary colour amplitude to the standard value (E_0) shall be plotted on the ordinate in decibels using a linear scale, and the ratio of the burst amplitude to the standard amplitude shall be plotted on the abscissa, in decibels using a linear scale.

Note. — NTSC receivers employing both burst and chrominance A.G.C. should have the chrominance A.G.C. inoperative to obtain the range of the colour saturation adjuster.

SECTION THIRTY-SEVEN — VARIATION OF COLOUR SATURATION AND HUE DUE TO INACCURATE SYNCHRONIZING LEVEL — NTSC AND PAL SYSTEMS

87. Method of measurement

The receiver shall be put under the standard measuring conditions with a television signal modulated by a colour bar signal applied to the input (see Publication 107-1, Sub-clause 3.16).

The synchronizing signal level at which colour saturation and hue respectively change shall be measured by changing the synchronizing signal level in the same method as described in Clause 83.

88. Presentation of results

The results shall be shown as follows:

Level at which saturation changes:	+	dB
	-	dB
Level at which hue changes:	+	dB
	-	dB

SECTION THRITY-EIGHT — CHROMINANCE SUBCARRIER LEVEL FLUCTUATION — NTSC AND PAL SYSTEMS

89. Introduction

In some household video tape recorders, the chrominance subcarrier signal is not recorded using frequency modulation. This means that amplitude fluctuations can affect the playback signal. The fluctuations can be sinusoidal or step-like in form, when the video tape recorder has multiple heads.

The measurements determine the ability of the receiver's colour A.G.C. circuit to compensate for such fluctuations.

90. Method of measurement — Sinusoidal fluctuations

The circuit arrangement shall be composed as shown in Figure 25 and the switch shall be set to position 1. The receiver shall be put under standard measuring conditions with a television signal modulated by a colour bar signal applied to the input (see Publication 107-1, Sub-clause 3.16).

Where the receiver uses a colour difference drive, an oscilloscope shall be connected to the B-Y colour difference input of the picture tube. Where the receiver uses a primary colour drive, the oscilloscope shall be connected to the input of the picture tube.

The chrominance subcarrier including the reference burst signal of a signal generator shall be modulated with a sine wave signal of between several hertz to several hundred hertz with a 30% modulation factor.

91. Presentation of results

The results of measurement shall be presented graphically. The peak-to-peak values of the colour output voltage that are delivered from the colour output circuit when the chrominance subcarrier is modulated with the sine wave shall be divided by the peak-to-peak value of the colour signal that is delivered when the chrominance subcarrier is not modulated with the sine wave. The resulting ratio shall be plotted on the ordinate using a linear scale and the sine wave modulation frequency on the abscissa using a logarithmic scale.

The modulation frequency at which colour synchronization becomes unstable shall be recorded. If hue changes, it shall also be recorded (see Figure 26).

92. Method of measurement — Step fluctuations

The measurement setup shall be composed as shown in Figure 25 and the switch shall be set to position 2.

The receiver shall be put under standard measuring conditions with a television signal modulated by a colour bar signal applied to the input (see Publication 107-1, Sub-clause 3.16).

The amplitude of the chrominance subcarrier signal shall be modulated with a rectangular wave signal of 25 Hz or 30 Hz from the signal generator, synchronized with the vertical synchronizing signal. The fluctuation of the colour output voltage shall be measured by an oscilloscope, for values of modulation factor from 0% to 50%.

The waveforms of the output voltage may exhibit overshoot or undershoot (see Figure 31). The amplitudes shall be measured at the centre of the active field interval (A', B' in Figure 27) and at a specified instant near the beginning of the interval (A'', B'' in Figure 31). Flicker phenomena, colour saturation at the upper part of the picture and hue fluctuation shall be checked.

The input and output picture waveforms are shown in Figure 27.

Notes 1. — Modulation factor: $\frac{A - B}{A + B} \times 100\%$

2. — Output fluctuation: $\frac{A' - B'}{A' + B'} \times 100\%$

93. Presentation of results

The modulation factor shall be plotted on the abscissa in percentage and the output fluctuation ratio or hue variation in degrees on the ordinate, as shown in Figures 28, 29 and 30.

The colour saturation at a specified instant in the vertical period (point A'' or B'') is also shown in Figure 31.

The colour saturation fluctuation is defined as:

$$\frac{2\,(A'' \text{ or } B'')}{(A' + B')}$$

SECTION THIRTY-NINE – CHROMINANCE PHASE STEP RESPONSE – NTSC AND PAL SYSTEMS

94. Introduction

In some video tape recorders, the recorded wavelength of the colour subcarrier may be of the same dimensions or smaller than the tape stretch caused by temperature and humidity changes. As a result, a phase step can occur during playback when the signal is switched from one head to another. Video tape recorders normally include special circuits to correct for phase and other timing errors, but because such circuits have a finite response time, residual errors in the signal applied to the receiver will remain, particularly at the instant of head switching.

The measurement determines the ability of the receiver to deal with such phase steps.

95. Method of measurement

The measurement setup is given in Figure 32. The receiver shall be put under standard measuring conditions with a television signal modulated by a colour bar applied to the input (see Publication 107-1, Sub-clause 3.16). The input signal shall be periodically switched between a delayed and undelayed condition, the switch timing being arranged to occur near the middle of each field. The delay shall be chosen to be 56 ns, 112 ns or 168 ns with an accuracy of ± 15 ns.

An example of the receiver response is shown in Figure 33.

96. Presentation of results

The results are expressed in terms of the number of lines having visible disturbances of hue or saturation. The total duration of the visible disturbances can be calculated from the number of lines affected and this time stated with the results, if preferred.

SECTION FORTY – INCORRECT REFERENCE BURST SIGNAL WAVEFORM OR POSITION – NTSC AND PAL SYSTEMS

97. Introduction

The reference burst signal is inserted for a period of approximately 8 cycles in the NTSC system and for approximately 10 cycles in the PAL system as shown in Figure 44a. In some household video equipment, the reference burst signal may differ from broadcasting standards with regard to the number of burst cycles or signal amplitude taper, which has an equivalent effect to narrowing the burst, or to the position at which the burst is inserted.

The colour changes due to incorrect reference burst signal duration or position are measured.

98. Method of measurement

The measurement setup is shown in Figure 34. An oscilloscope shall be connected to the video detector output to observe the reference burst signal. It is also connected to the colour output, to observe the output level and waveform. Then, the number of cycles of the reference burst, from the video signal generator, is varied between 4 and 16 cycles.

The following shall be measured by the oscilloscope, with respect to the number of burst cycles inserted:

1) colour output level;
2) colour killer operation point;
3) hue change;
4) colour synchronization.

The measurement is then repeated, with the number of burst cycles held constant, at the standard value, but changing the position of the reference burst with reference to the front edge of the synchronizing signal (see Figure 39). The same four characteristics as in the previous measurement are recorded.

99. **Presentation of results**

The results shall be presented graphically with the measured values on the ordinate. The number of cycles of the reference burst, or the burst position in microseconds, shall be plotted on the abscissa.

Examples of the results of the first measurement are shown in Figures 35, 36, 37 and 38, and of the second measurement in Figures 40, 41, 42 and 43 respectively.

SECTION FORTY-ONE — INCORRECT IDENTIFICATION SIGNAL POSITION — SECAM SYSTEM

100. **Introduction**

In the SECAM system, the chrominance subcarrier signal is considered to be suppressed for a period of approximately $c+i$ as shown in Figure 44b. When an input signal with an inaccurate period of the suppressed chrominance subcarrier signal is generated by a VTR or other video equipment, and is applied to a receiver, the colour killing operation or the colour synchronization of the receiver will malfunction.

101. **Method of measurement**

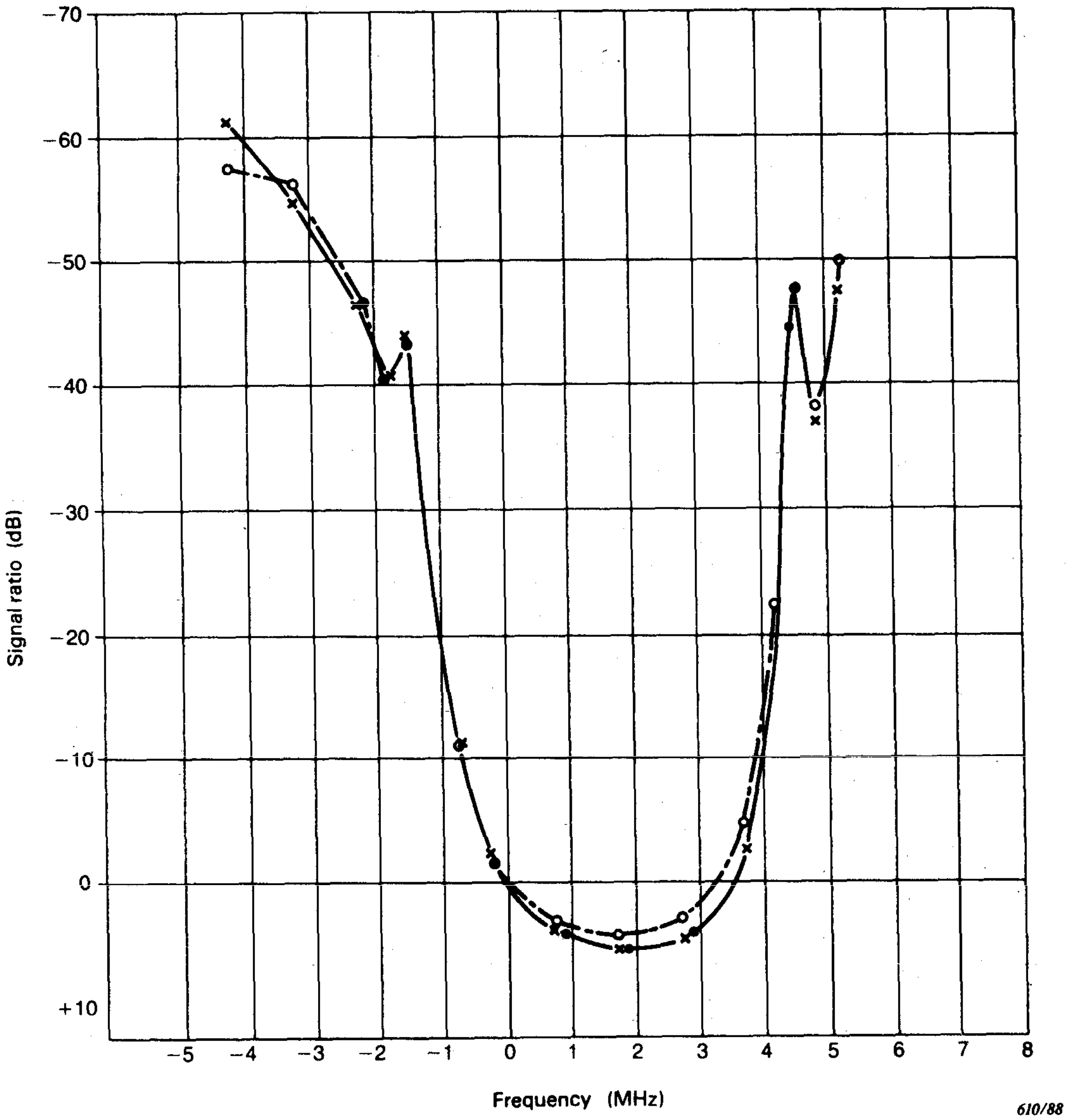
The receiver shall be put under standard measuring conditions with a television signal modulated by a colour bar signal applied to the input (see Publication 107-1, Sub-clause 3.16).

By varying the period indicated by i in Figure 44b from 5.0 μs up to the end of horizontal blanking period, and interrupting the r.f. signal for a short period, the colour killing operation or the colour synchronization can be checked for malfunction.

102. **Presentation of results**

The period indicated by i in Figure 44b, at which the colour killing operation or the colour synchronization malfunctions, shall be recorded in microseconds.

If other effects are visible on the screen, these shall be recorded together with the corresponding period i.



Input signal level: maximum usable input signal level
● = nominal frequency (Japanese channel 2)
× = +2 MHz
O = −2 MHz

FIG. 1. — Example of single signal selectivity.

Example of the effect of inaccurate sound carrier frequency

Interference		Shifted frequency	
		Modulation at 0%	1 kHz modulation at 80%
Picture	Luminance beat	None (up to ± 300 kHz)	None (up to ± 300 kHz)
	Colour beat	+ 200 kHz - 80 kHz	+ 200 kHz - 109 kHz
	Horizontal stripe	None (up to ± 300 kHz)	None (up to ± 300 kHz)
Sound	Buzz	+ 200 kHz - 145 kHz	+ 180 kHz - 128 kHz
	Sound distortion (10%)	—	+ 100 kHz - 118 kHz

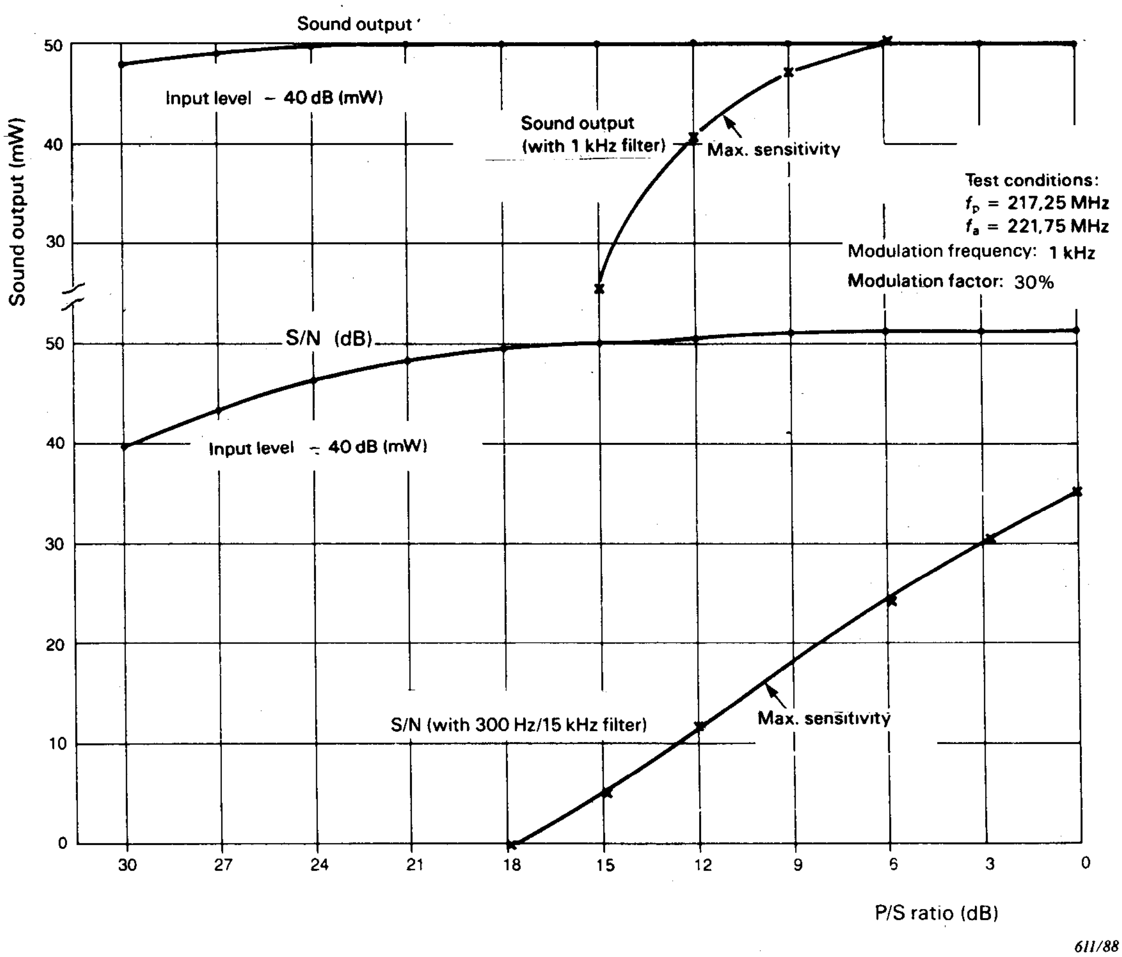


FIG. 2. — Example of sound output and signal-to-noise ratio to picture-to-sound ratio.

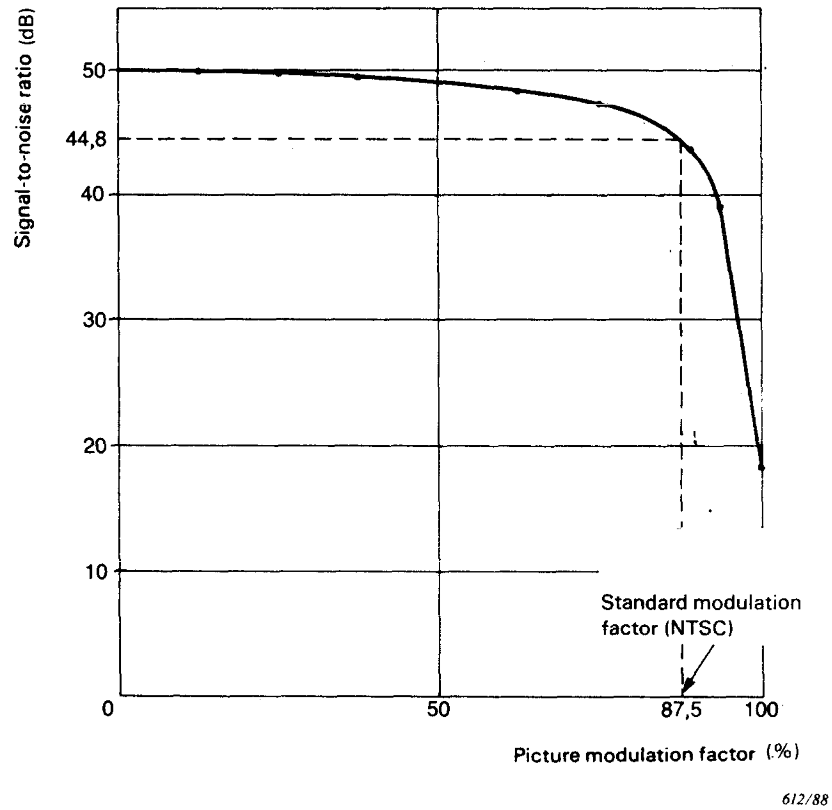


FIG. 3. — Example of inaccurate picture modulation factor (FM).

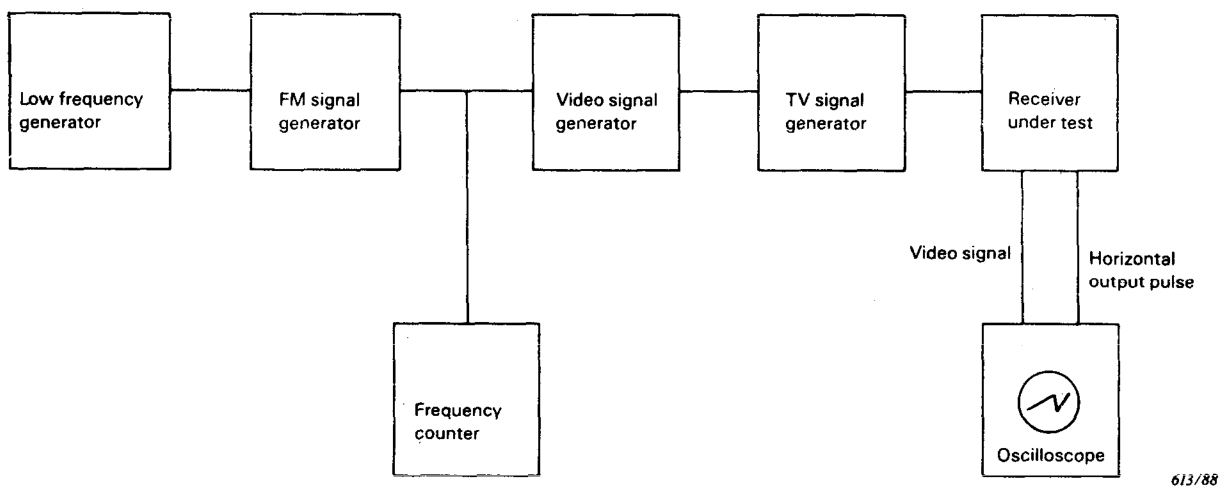


FIG. 4. — Circuit arrangement for measurement of line phase fluctuation due to line signal frequency fluctuation.

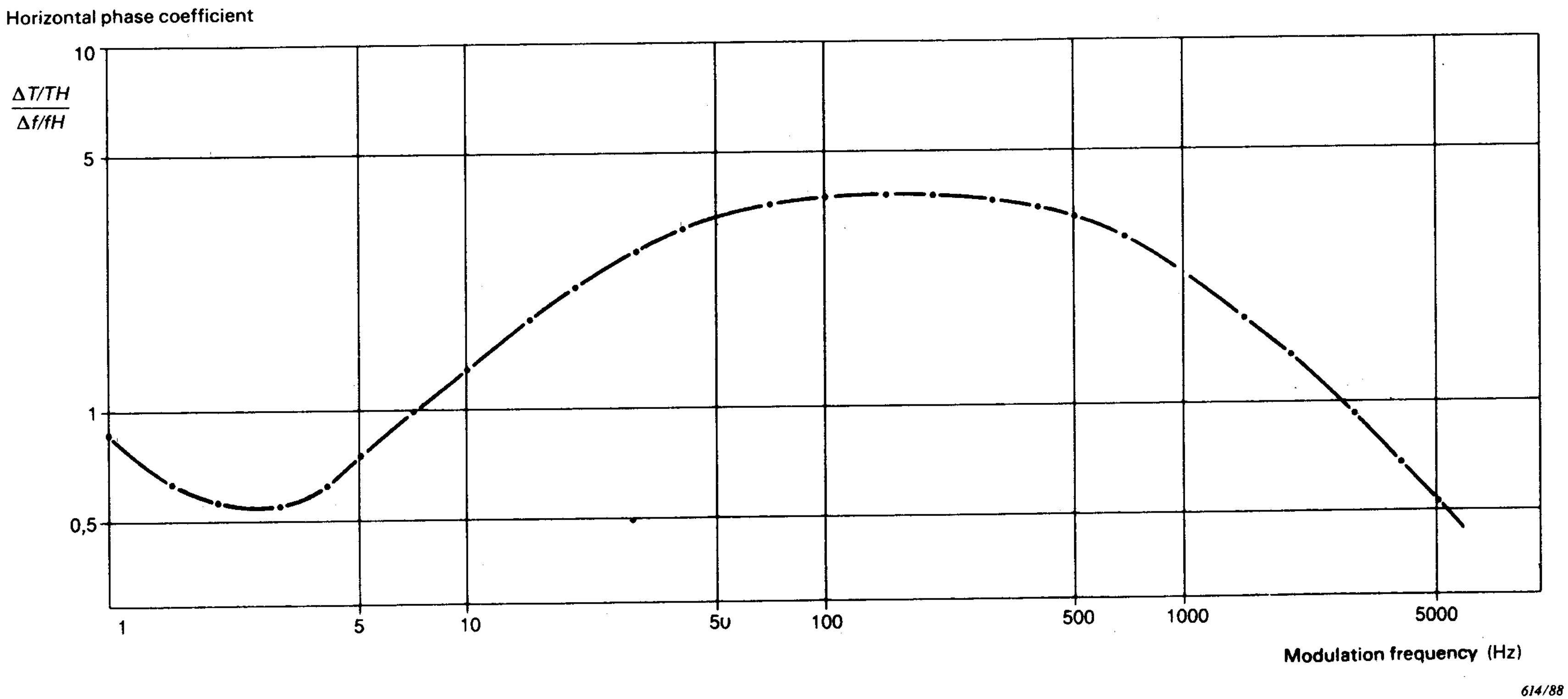


FIG. 5. — Example of line phase fluctuation.

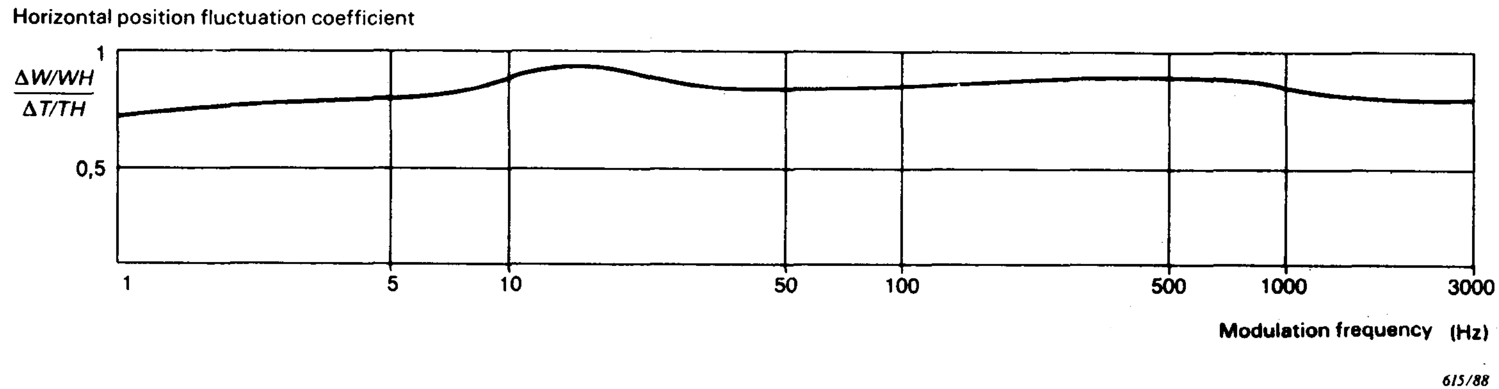


FIG. 6. — Example of horizontal position fluctuation.

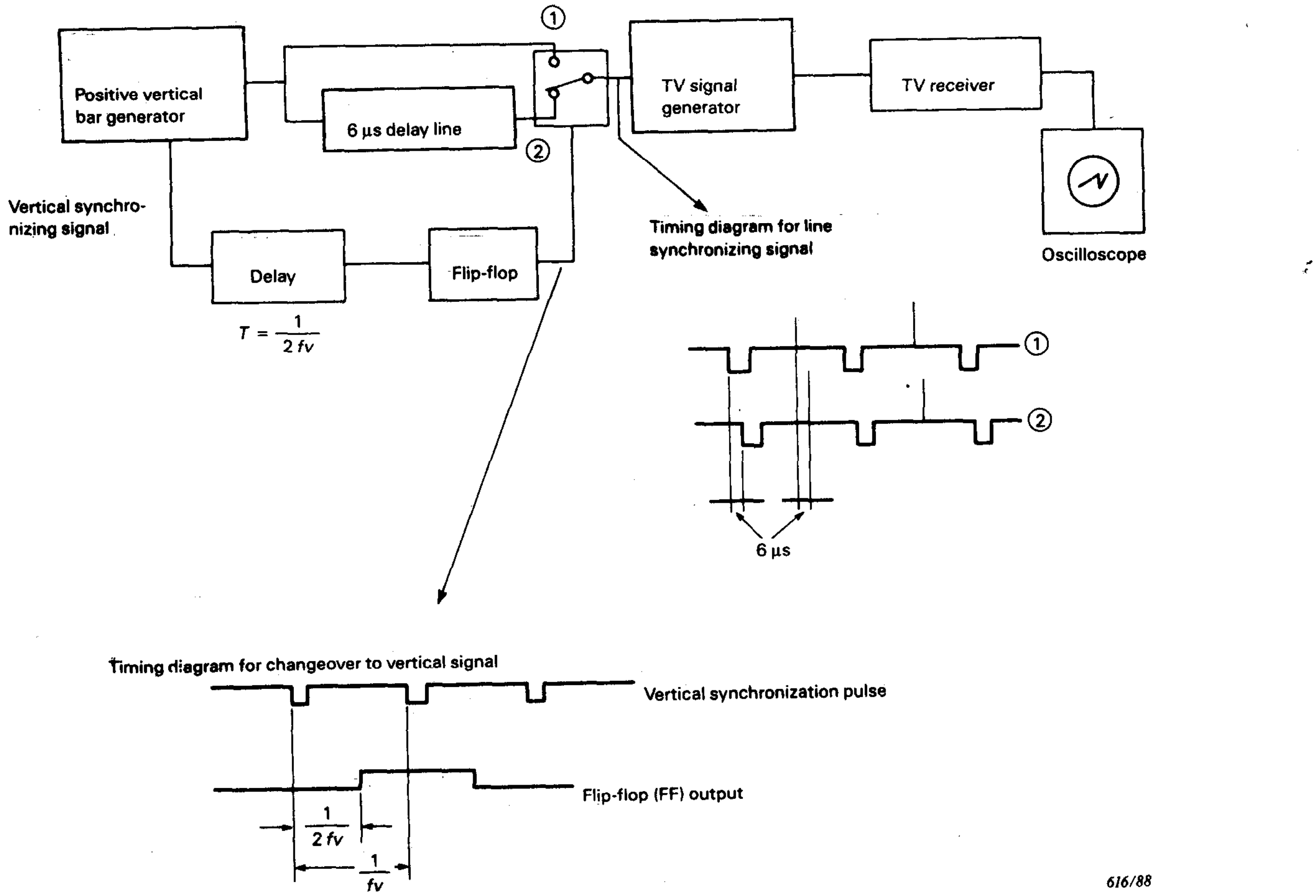
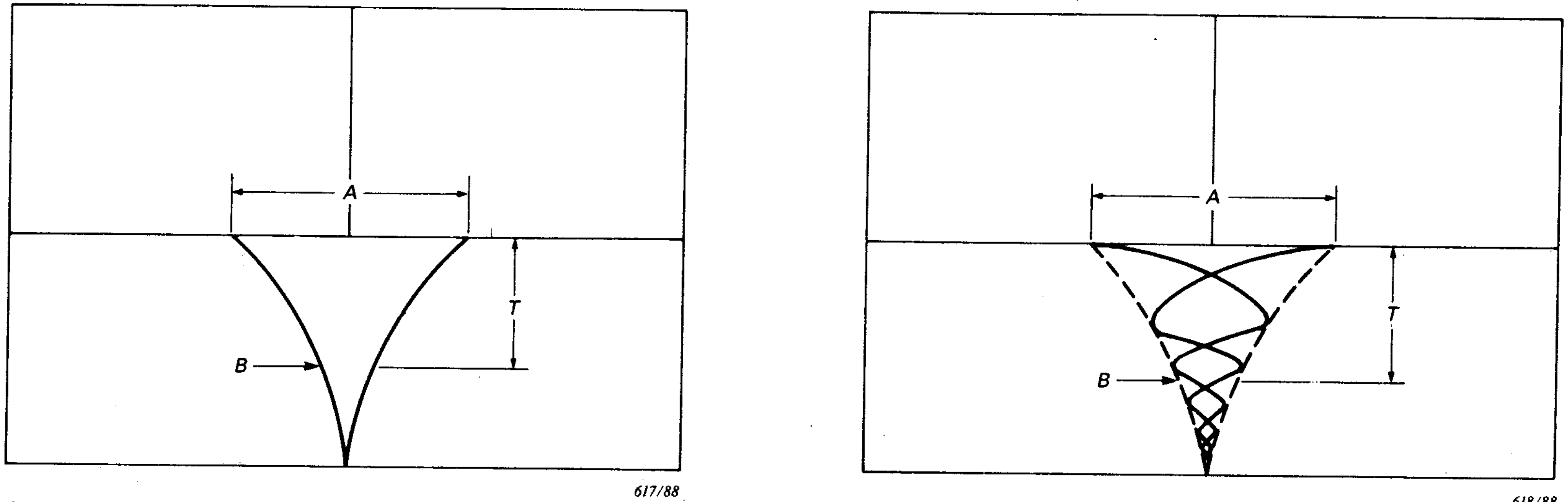


FIG. 7. — Circuit arrangement for phase step response.



a) Without overshoot

b) With overshoot

FIG. 8. — **Phase step response characteristics.**

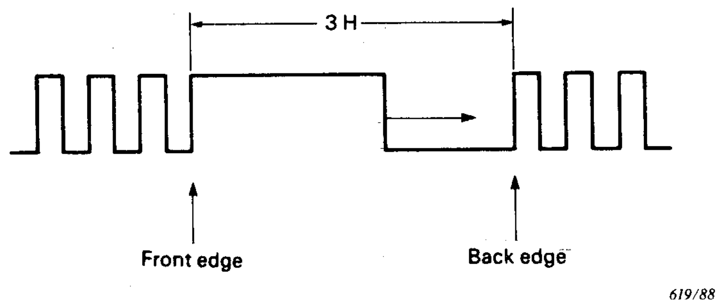


FIG. 9. — Vertical synchronizing test signal waveform.

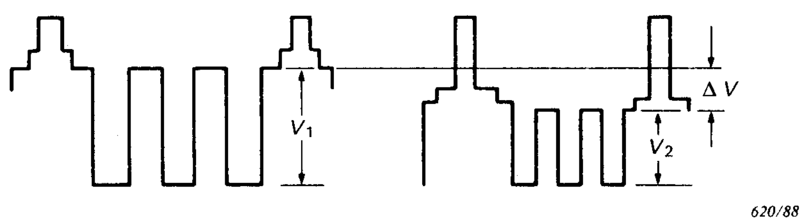


FIG. 10. — Test signal waveform.

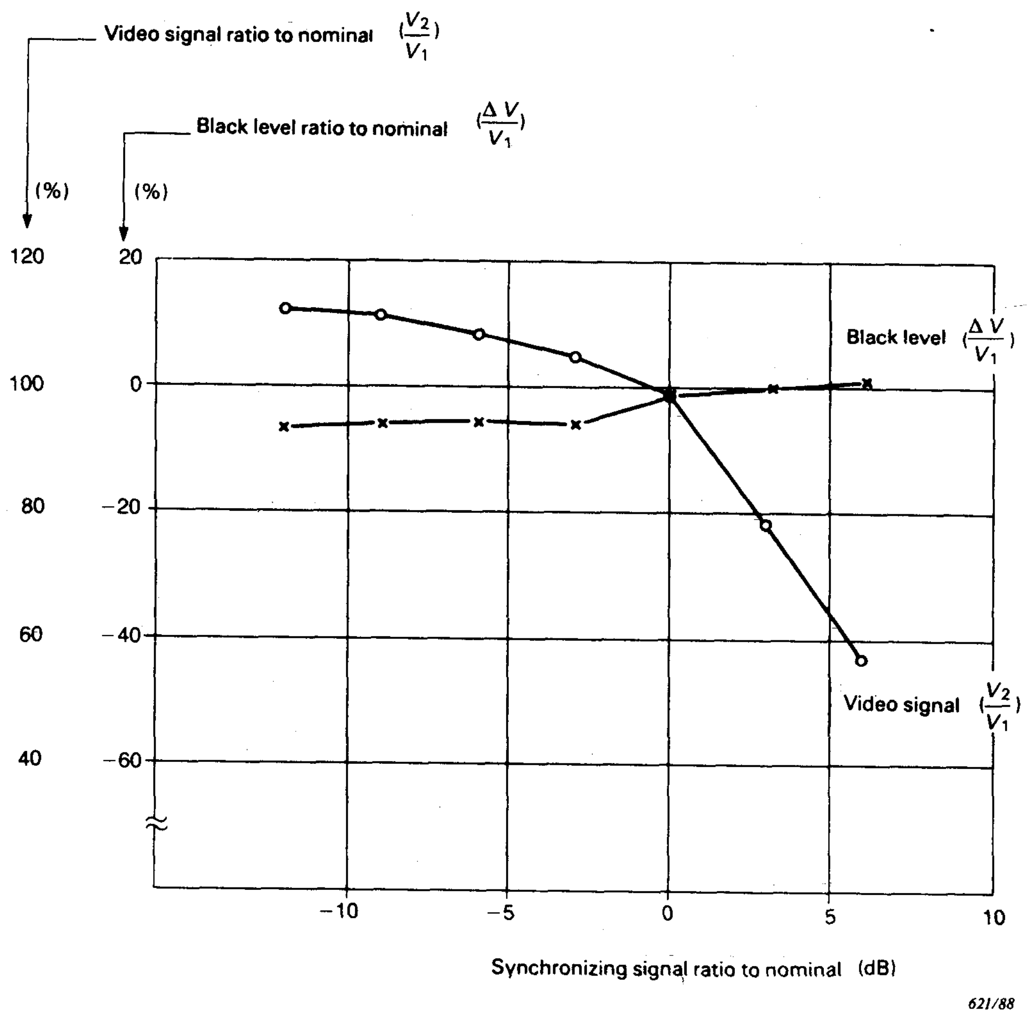


FIG. 11. — Example of inaccurate contrast and black level.

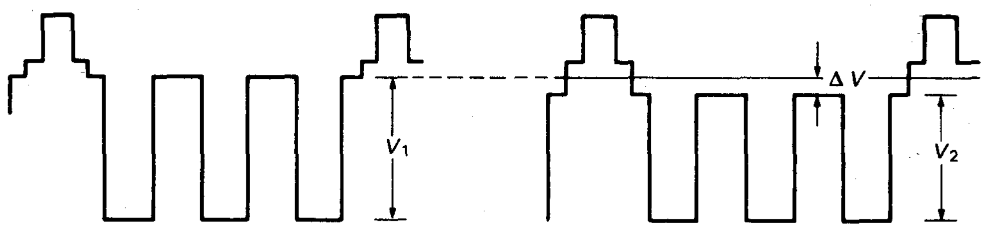


FIG. 12. — Test signal waveform.

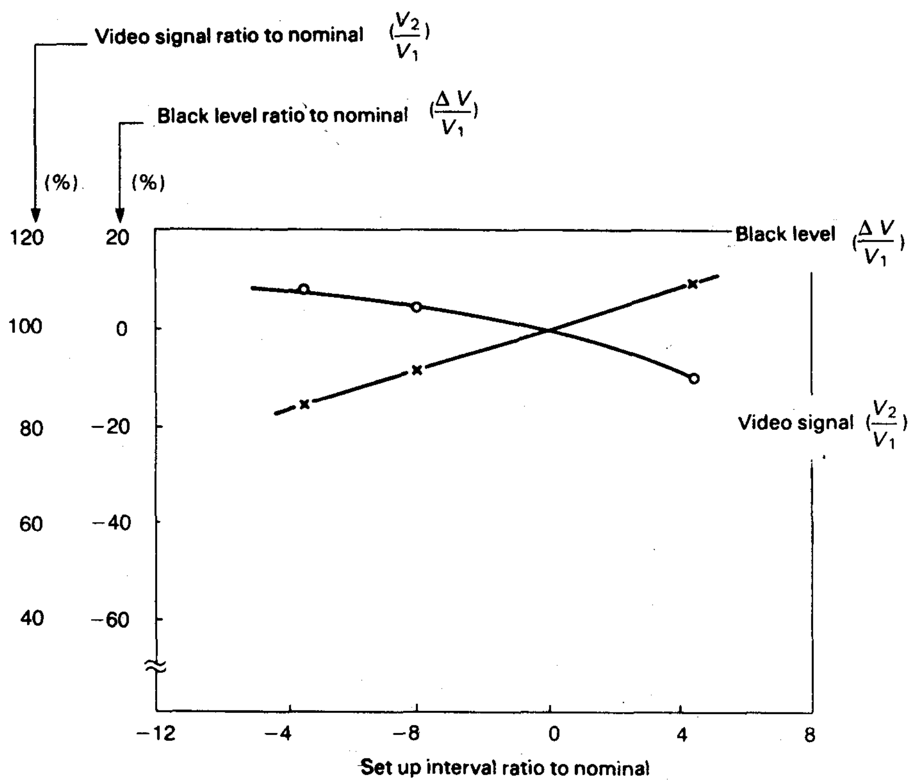


FIG. 13. — Example of inaccurate contrast and black level due to inaccurate set-up interval (NTSC).

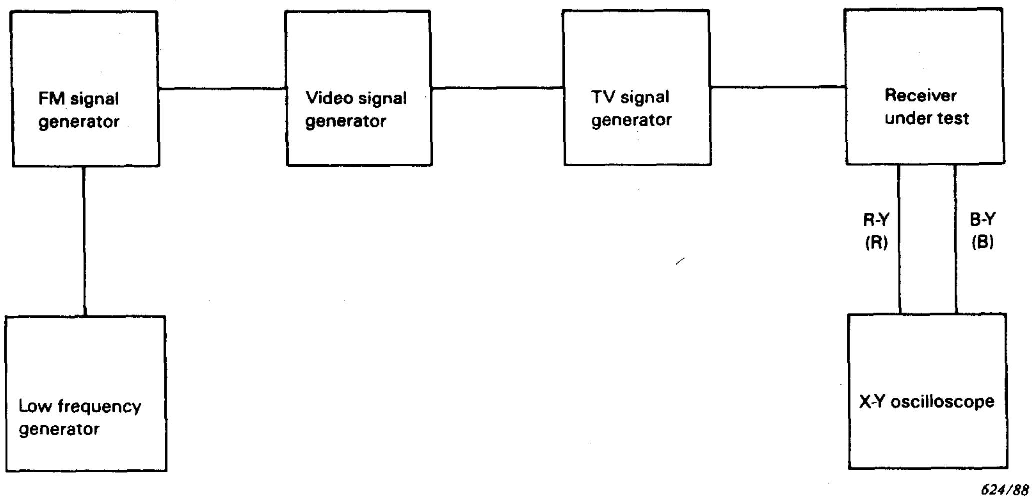


FIG. 14a. — Circuit arrangement for measurement of hue and saturation variation (NTSC and PAL).

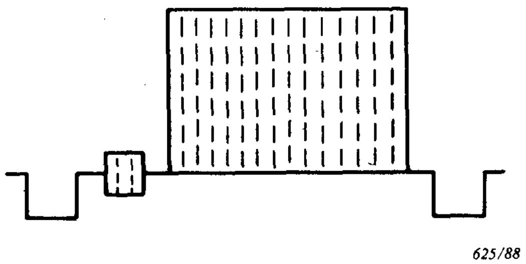


FIG. 14b. — Video signal for oscilloscope adjustment.

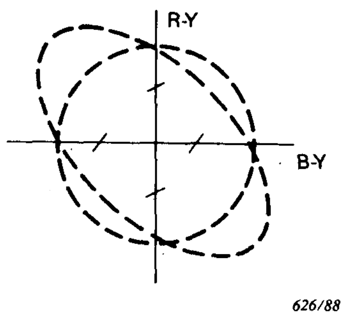


FIG. 14c. — Oscilloscope adjustment for equal R-Y and B-Y axes.

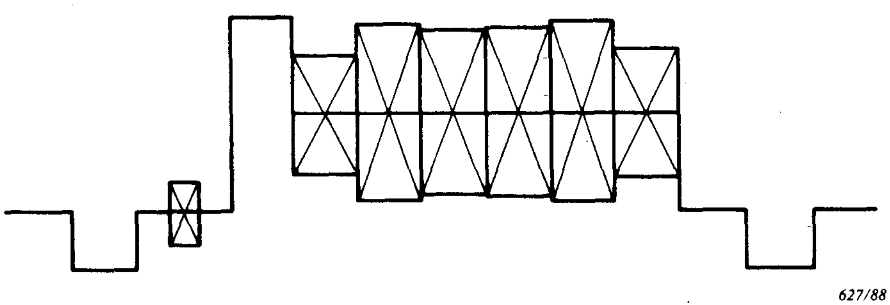


FIG. 15. — Test signal if only R and B signals are available (NTSC and PAL).

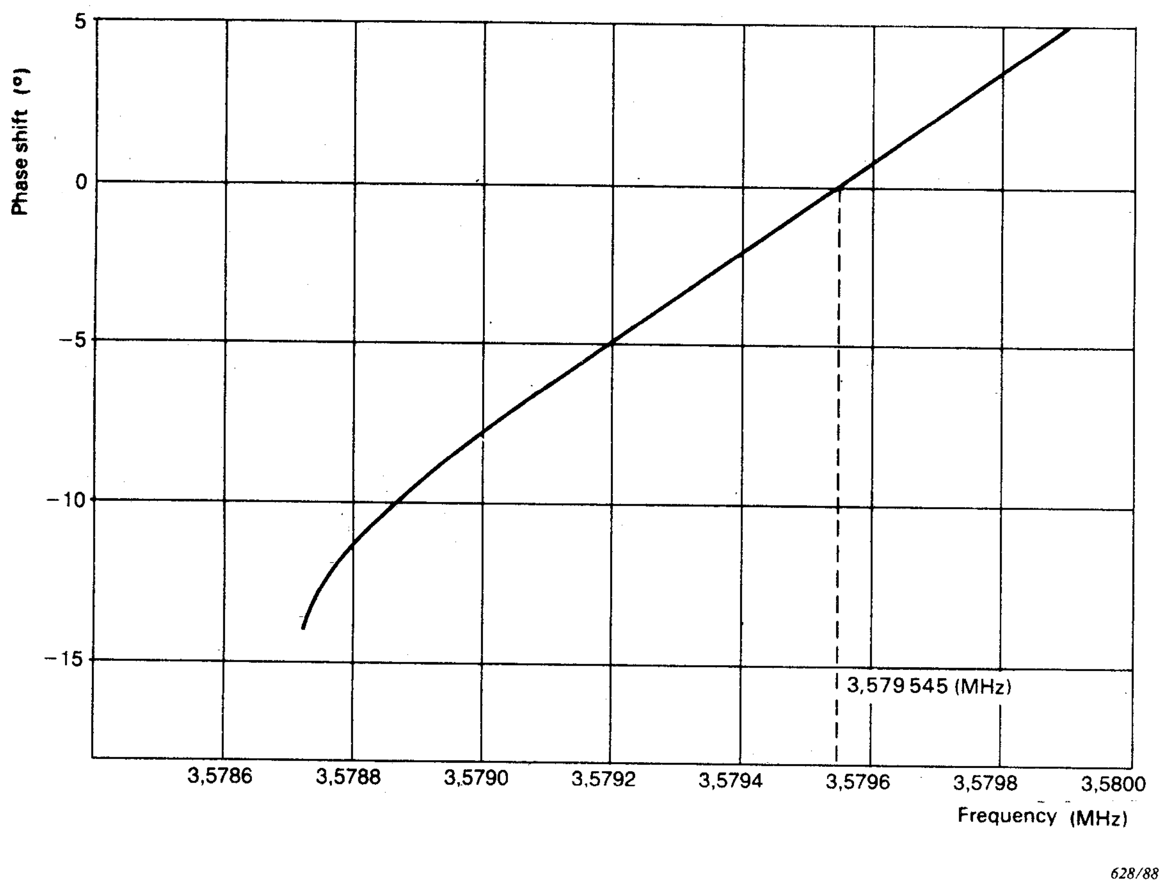


FIG. 16. — Example of hue variation (NTSC).

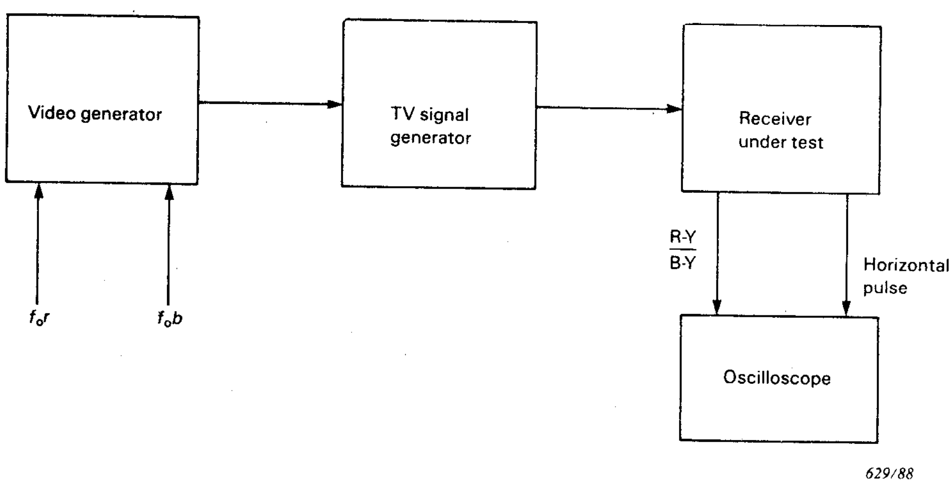


FIG. 17. — Circuit arrangement for measurement of hue variation (SECAM).

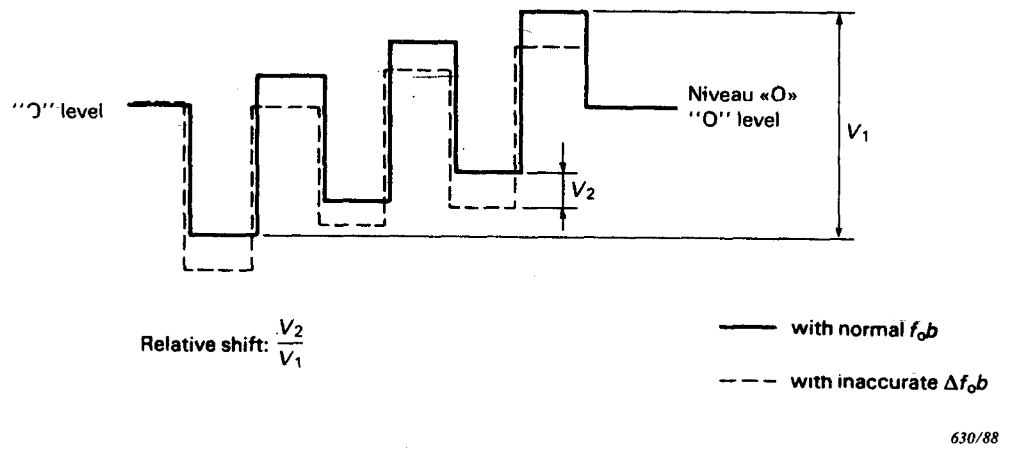


FIG. 18. — Waveform of B-Y (SECAM).

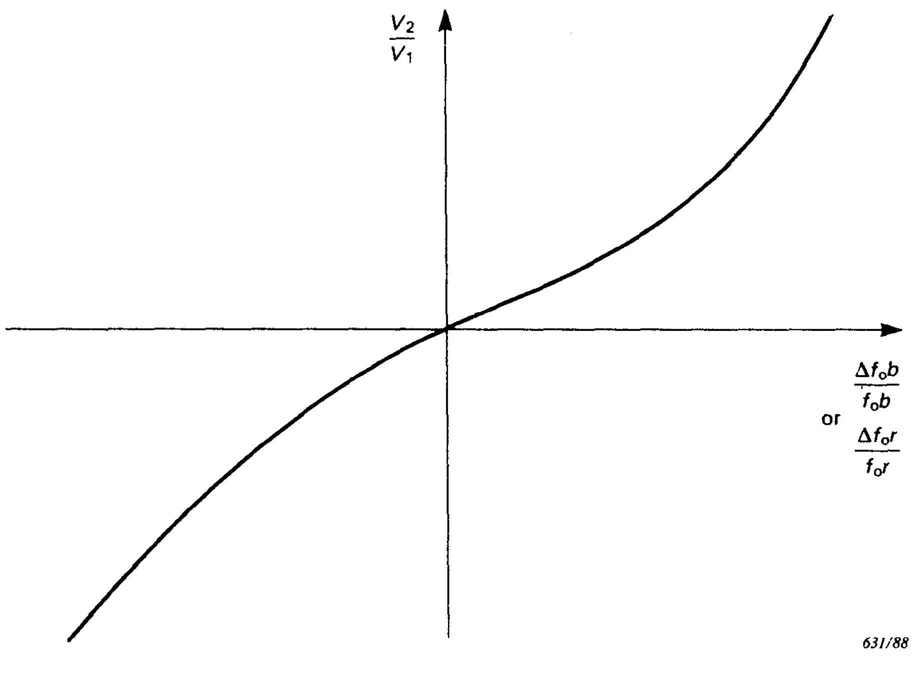


FIG. 19. — Example of hue variation (SECAM).

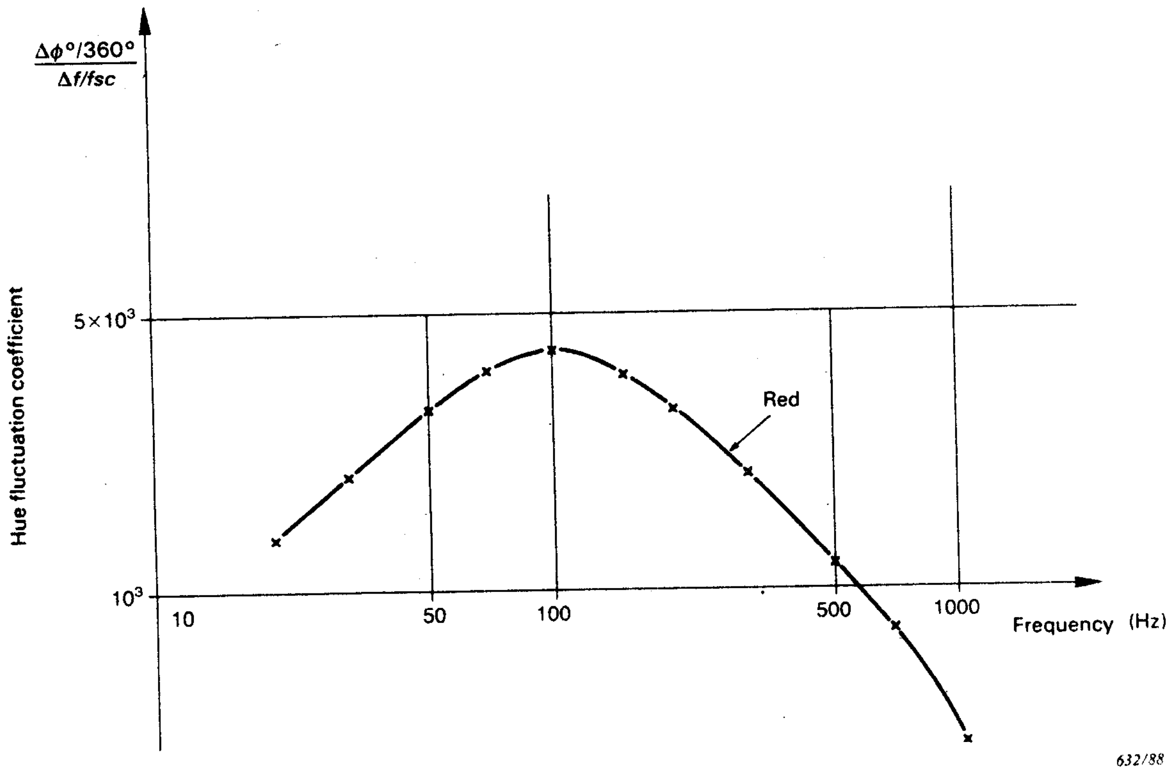


FIG. 20. — Example of hue fluctuation.

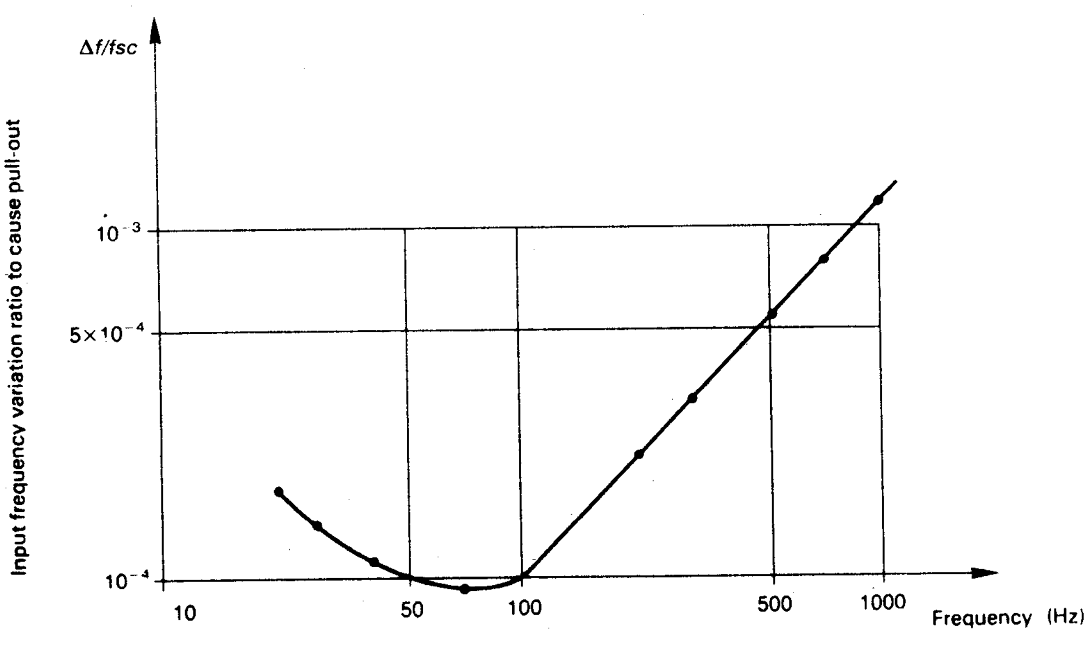


FIG. 21. — Example of colour synchronization characteristics.

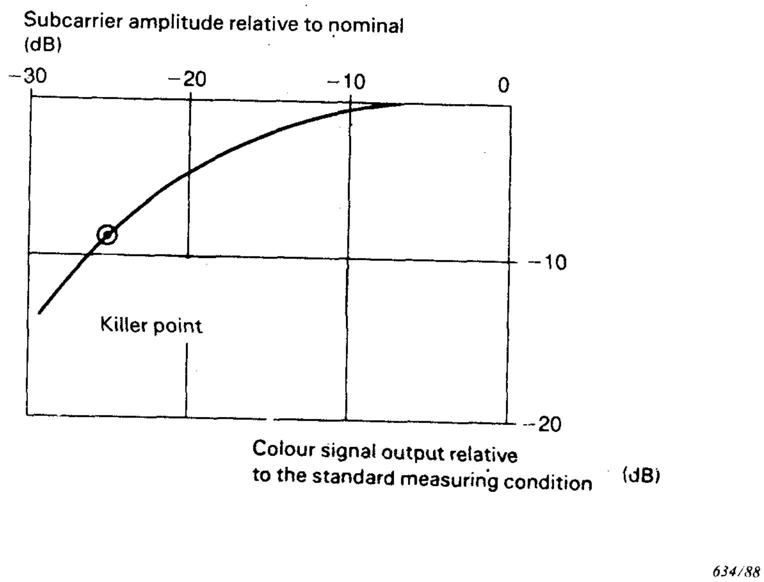


FIG. 22. — Example of inaccurate chrominance subcarrier level.

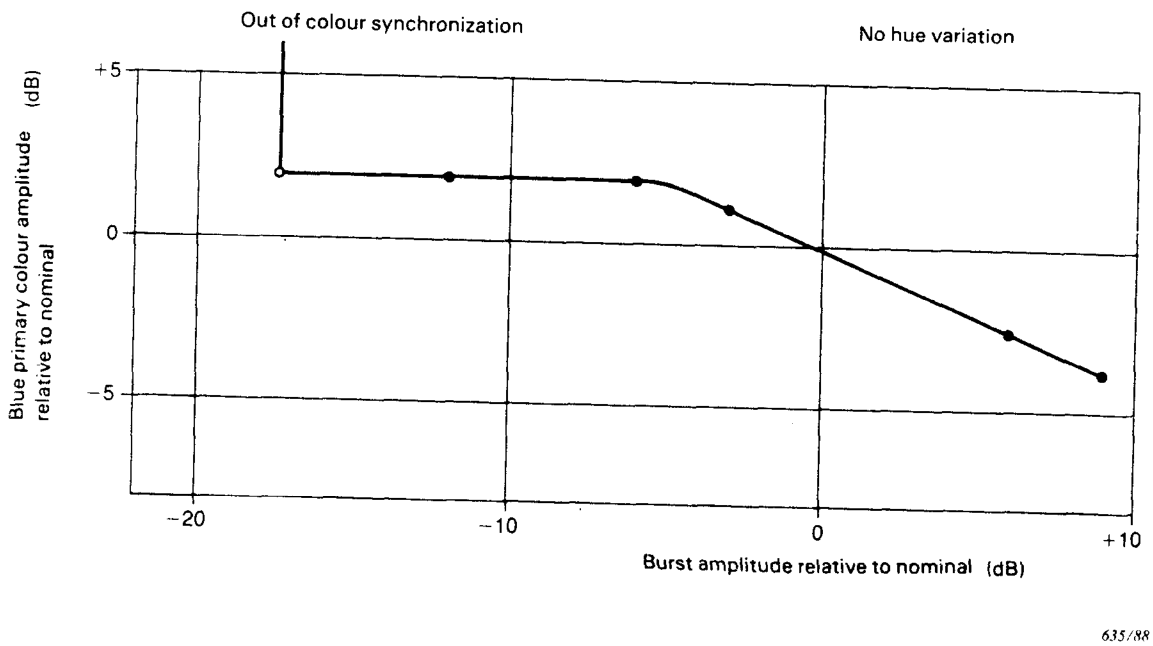


FIG. 23. — Example of colour output change.

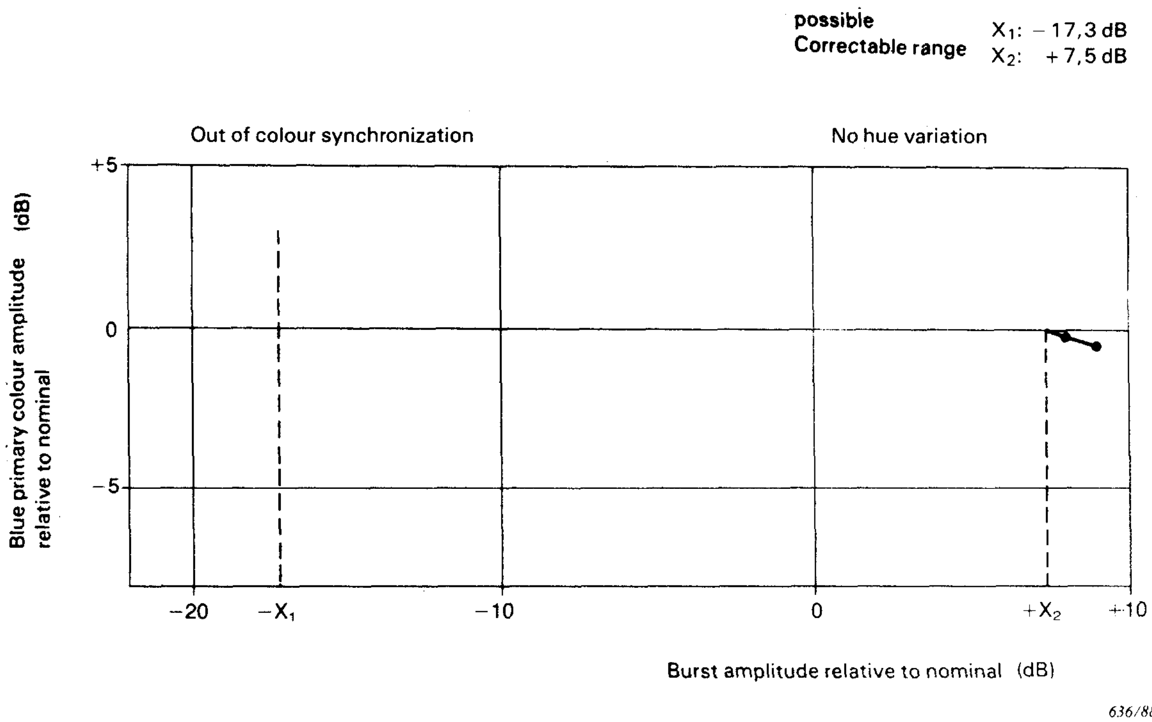


FIG. 24. — Example of correctable range by colour saturation adjuster.

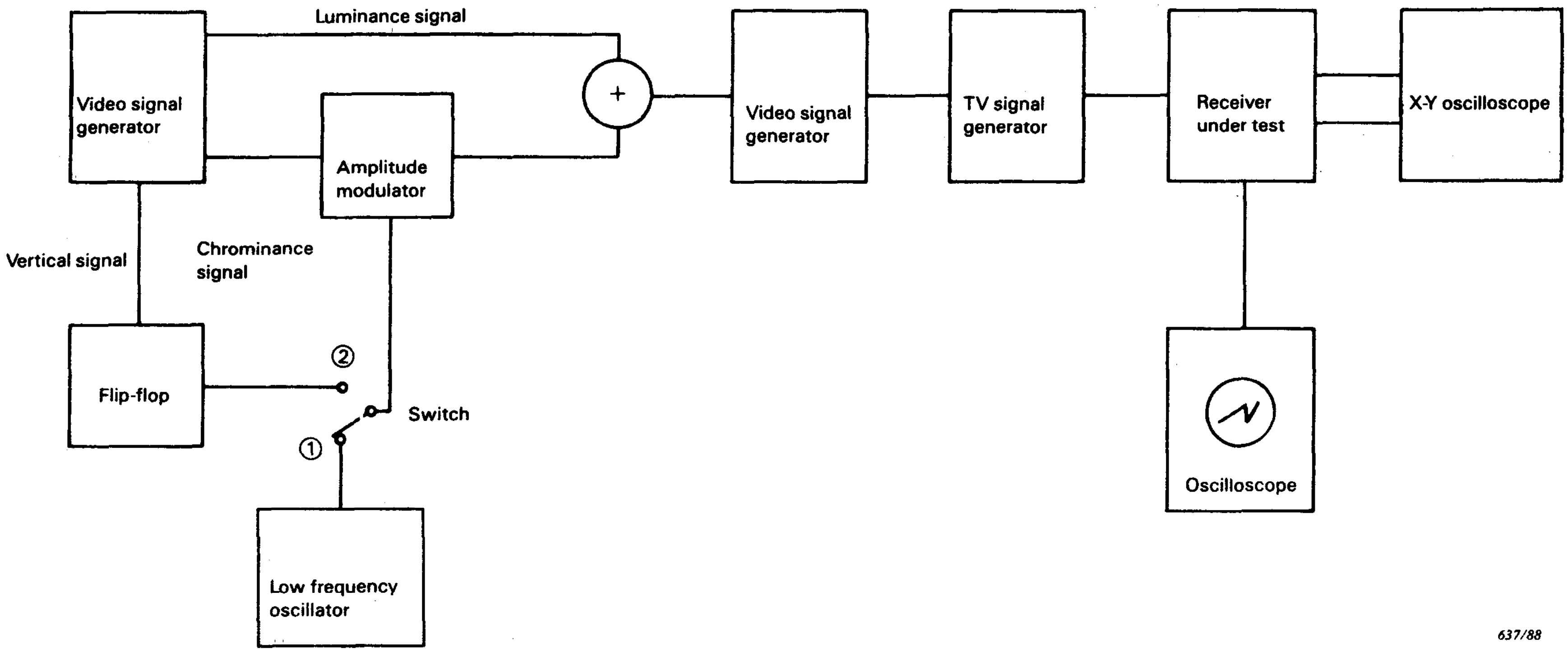


FIG. 25. — **Circuit arrangement for measurement of chrominance subcarrier level fluctuation (NTSC and PAL).**

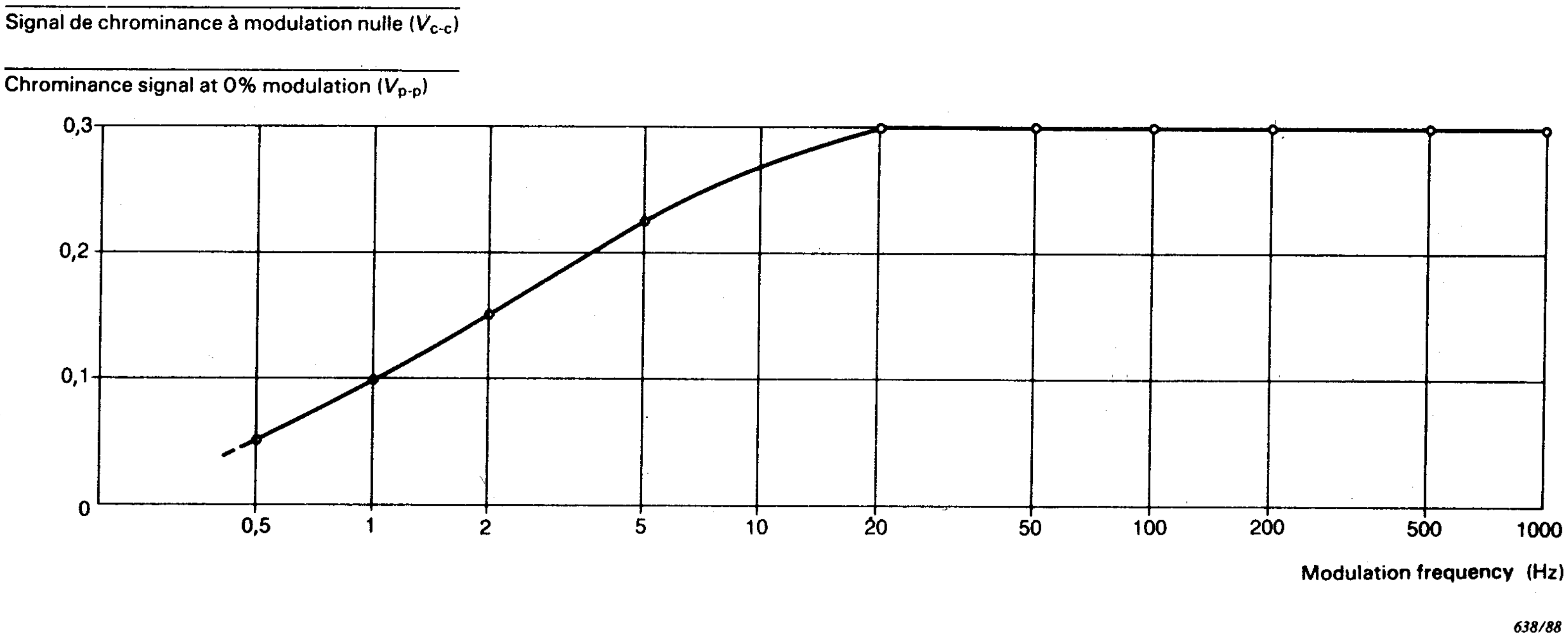


FIG. 26. — **Example of chrominance subcarrier level fluctuation (NTSC and PAL).**

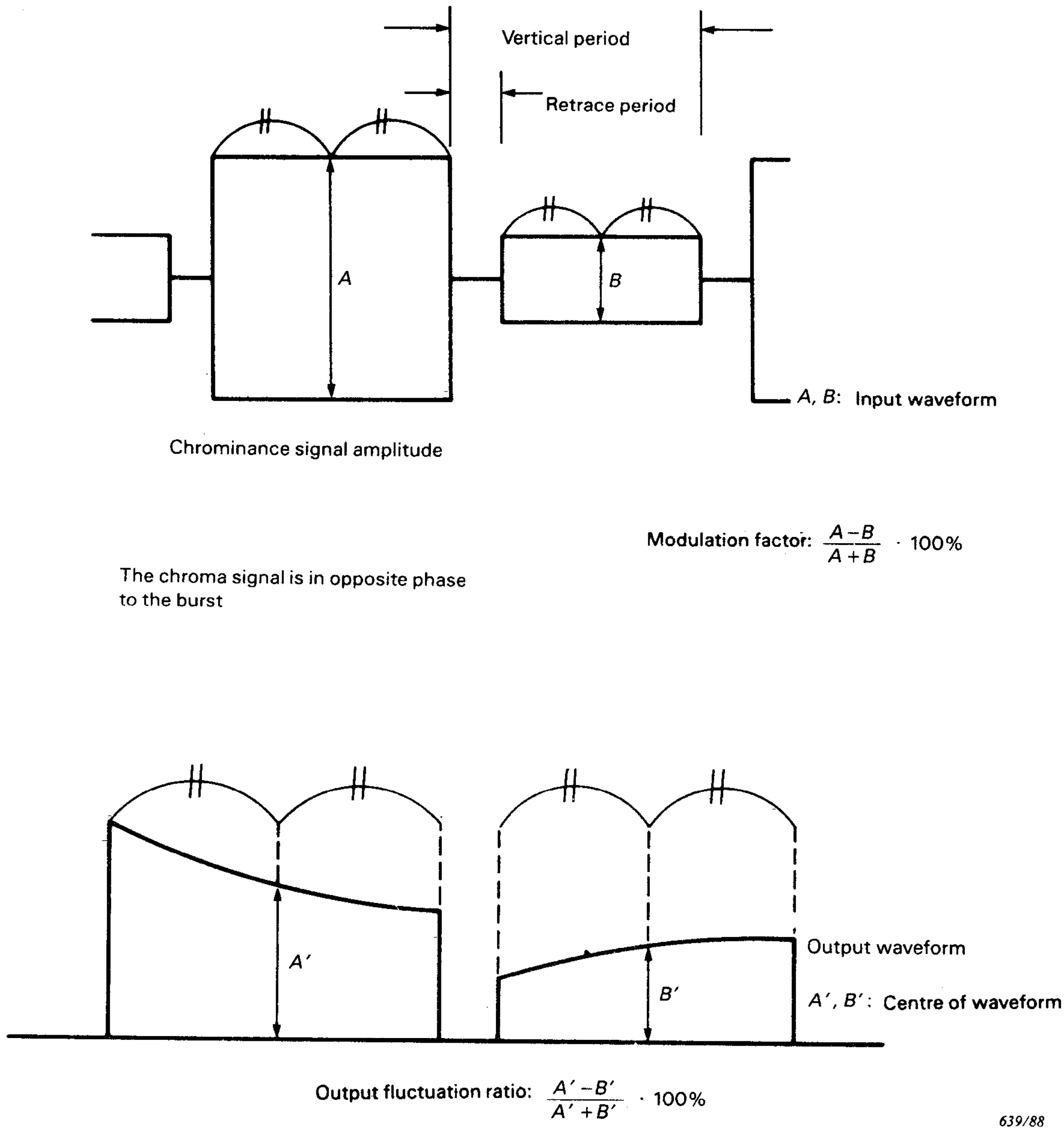


FIG. 27. — **Input and output waveform.**

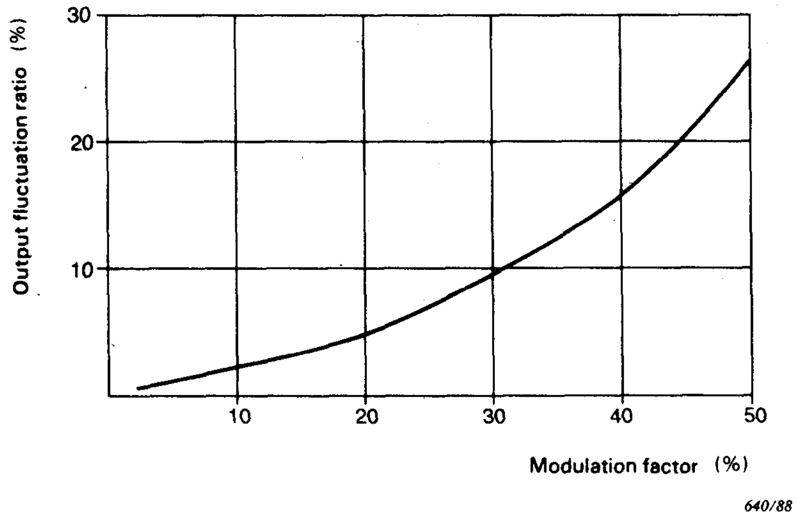


FIG. 28. — Example of colour output fluctuation due to step fluctuation of chrominance sub-carrier level.

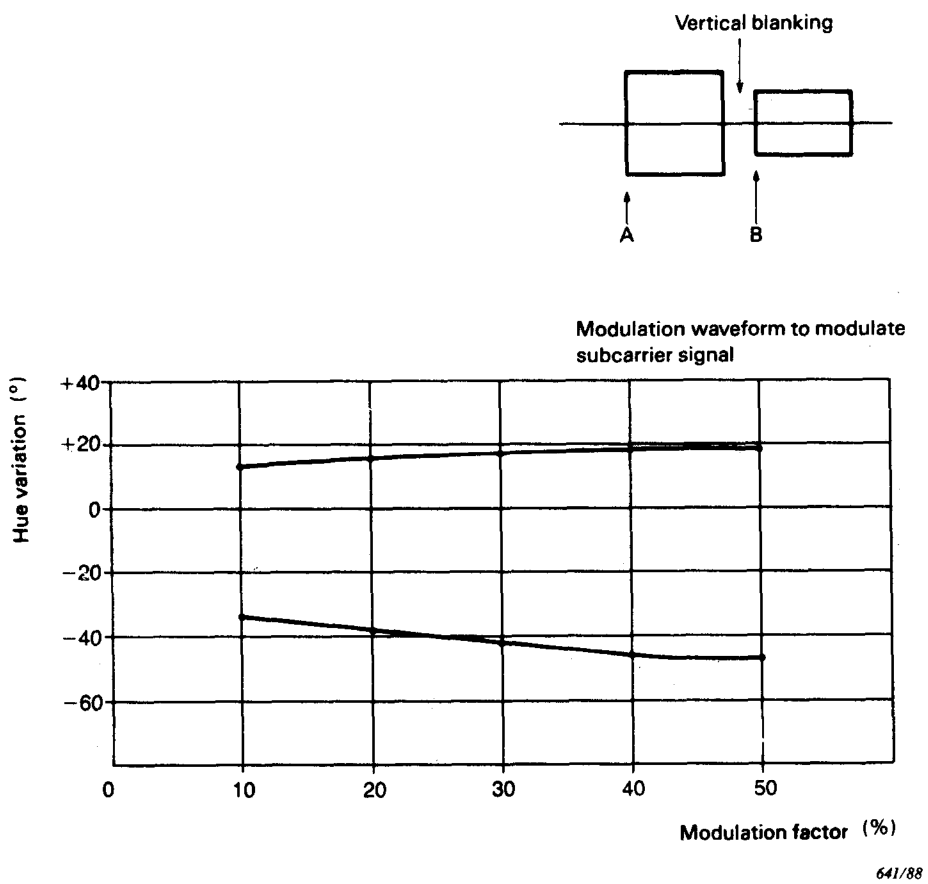
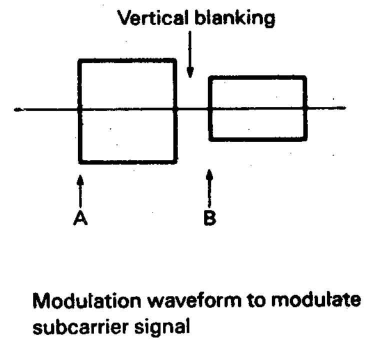


FIG. 29. — Example of hue fluctuation at the point A of modulation waveform due to the step fluctuation of chrominance subcarrier level.



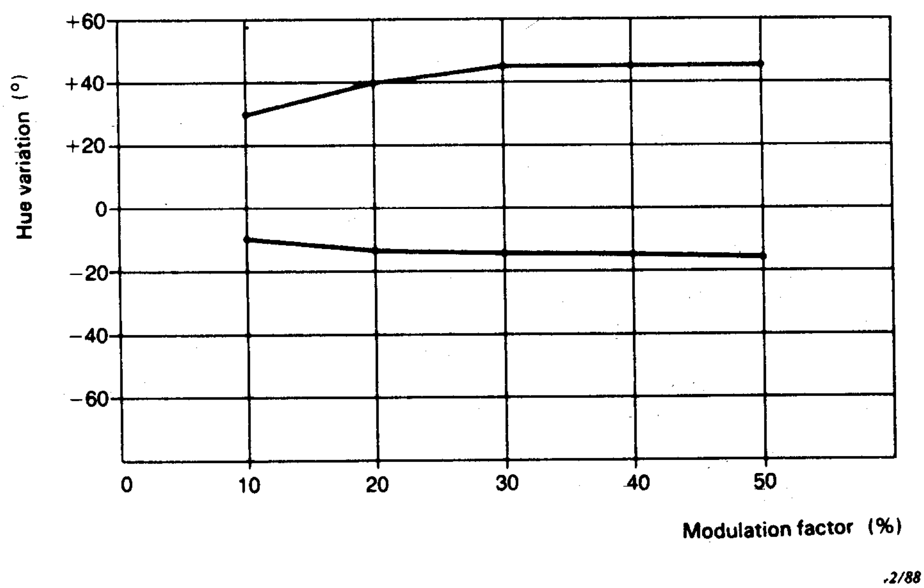


FIG. 30. — Example of hue fluctuation at the point B of modulation waveform due to the step fluctuation of chrominance subcarrier level.

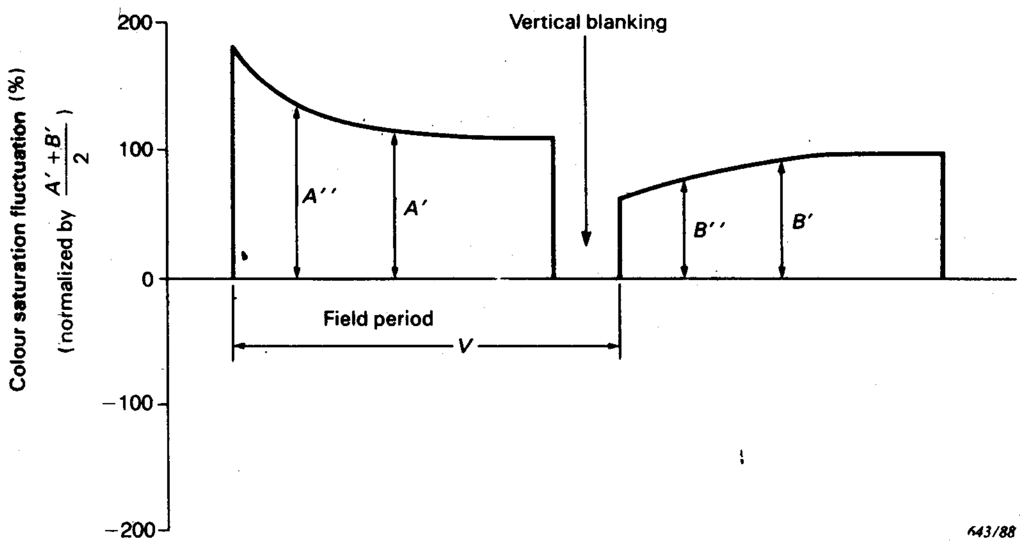


FIG. 31. — Example of over-response waveform due to the step fluctuation of chrominance sub-carrier level.

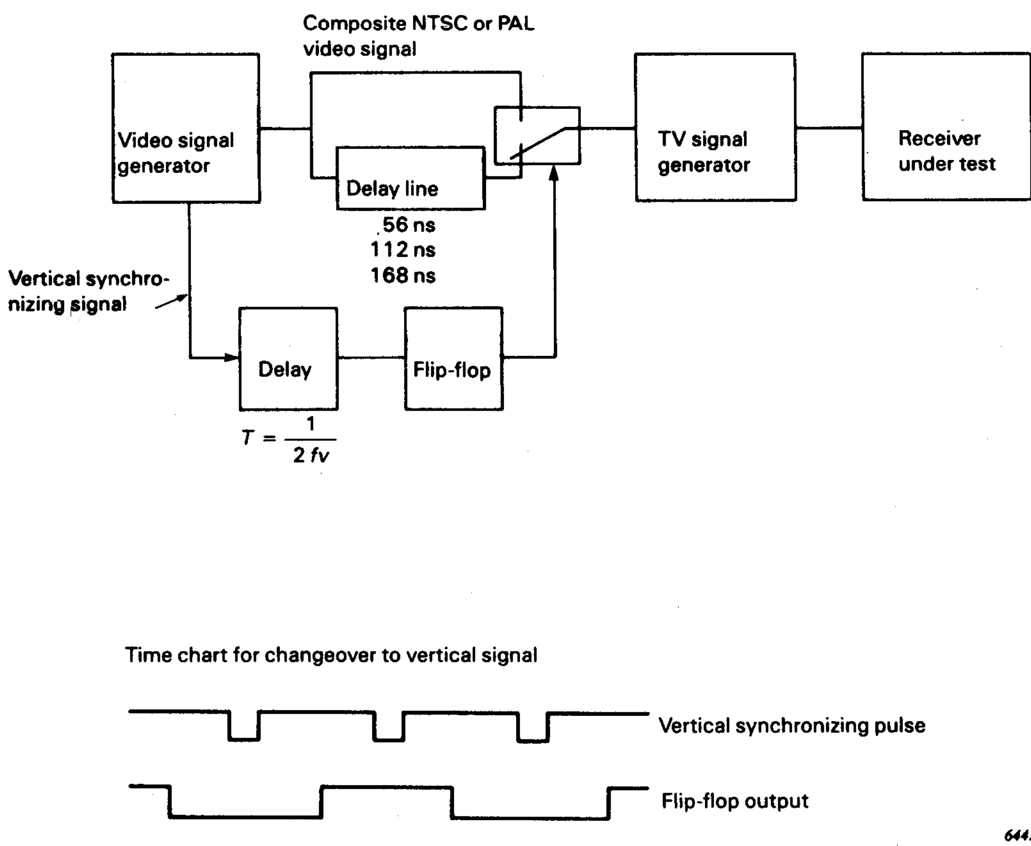


FIG. 32. — Circuit arrangement for measurement of phase step response in colour decoding.

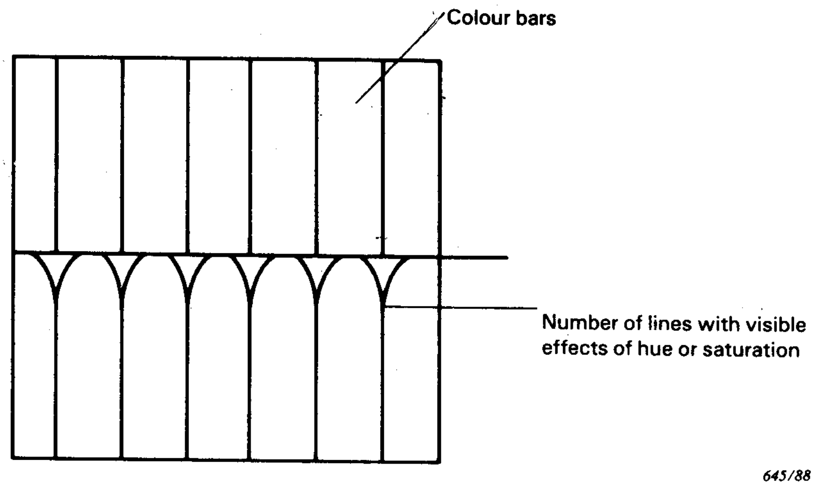


FIG. 33. — Example of distortion of hue or saturation after a phase step in colour subcarrier.

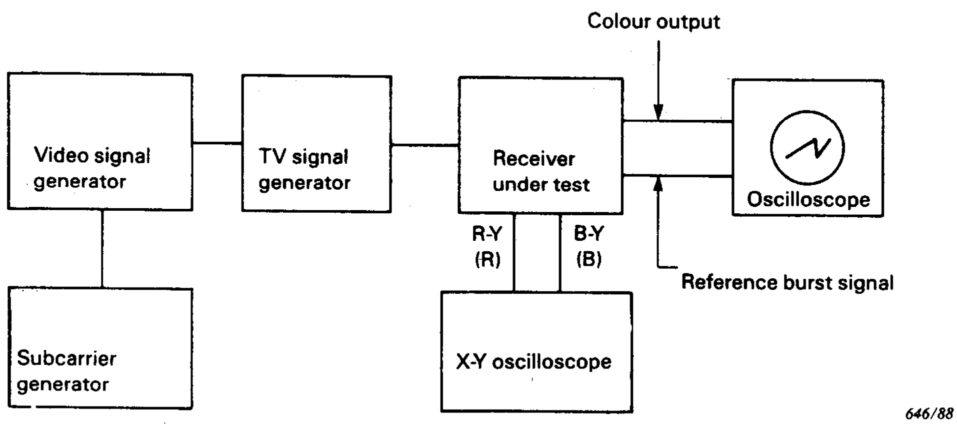


FIG. 34. — Circuit arrangement for the measurement of incorrect reference burst signal waveform.

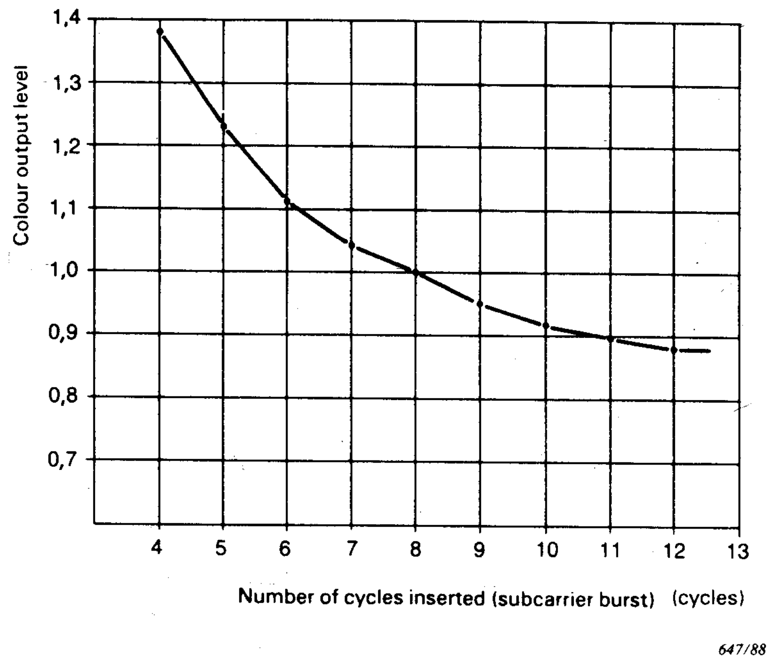
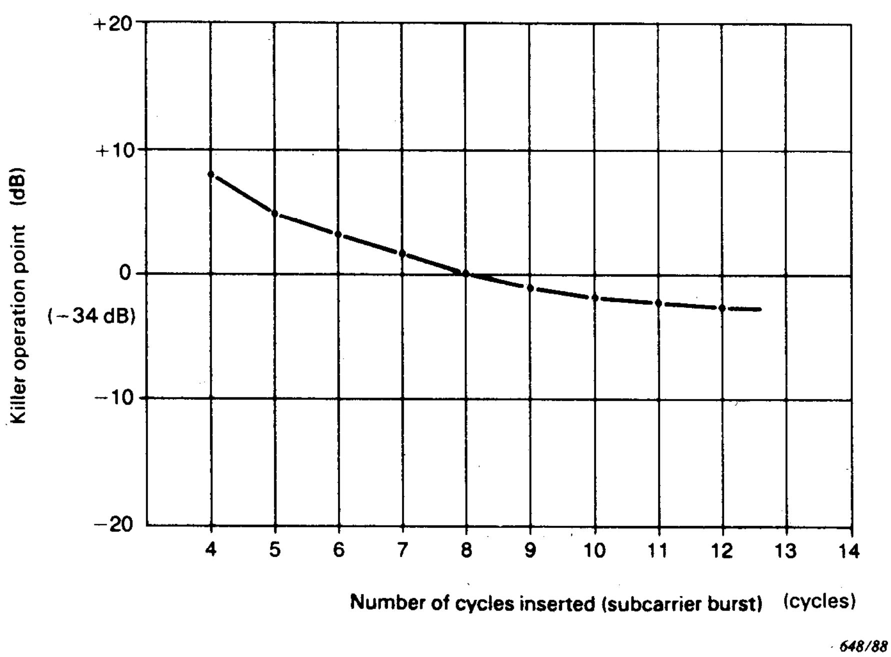


FIG. 35. — Example of colour output level vs. number of cycles inserted.



Note. — 0 dB (−34 dB) means colour-killing operation level at 8 cycles inserted for subcarrier burst.

FIG. 36. — Example of colour-killing operation point vs. number of cycles inserted (NTSC).

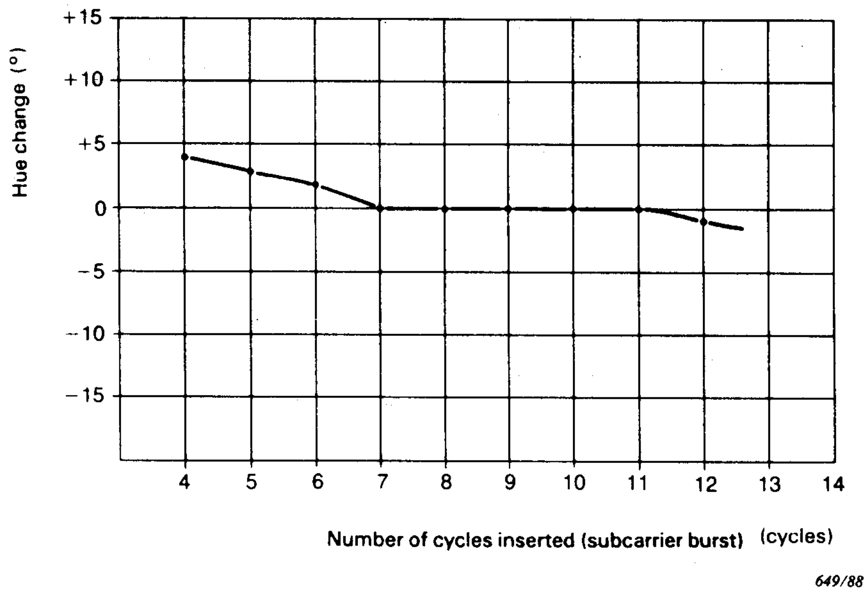


FIG. 37. — Example of hue change vs. number of cycles inserted (NTSC).

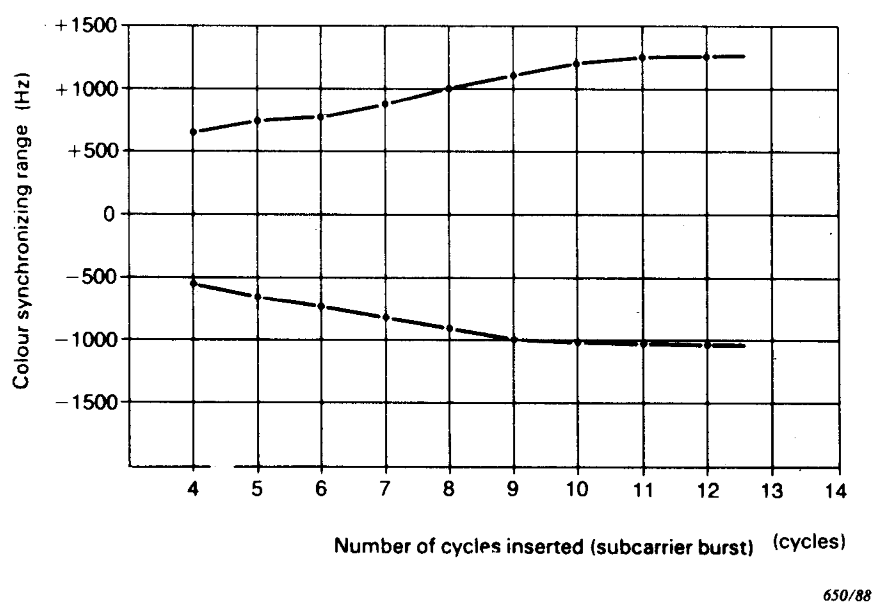


FIG. 38. — **Example of colour synchronization range vs. number of cycles inserted (NTSC).**

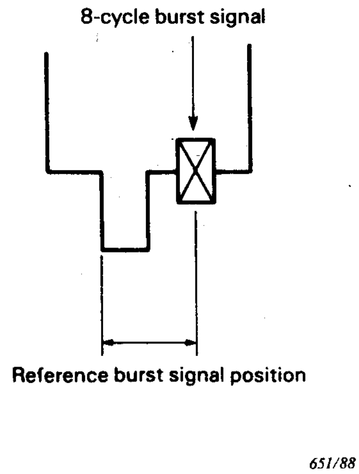


FIG. 39. — Reference burst signal position (NTSC).

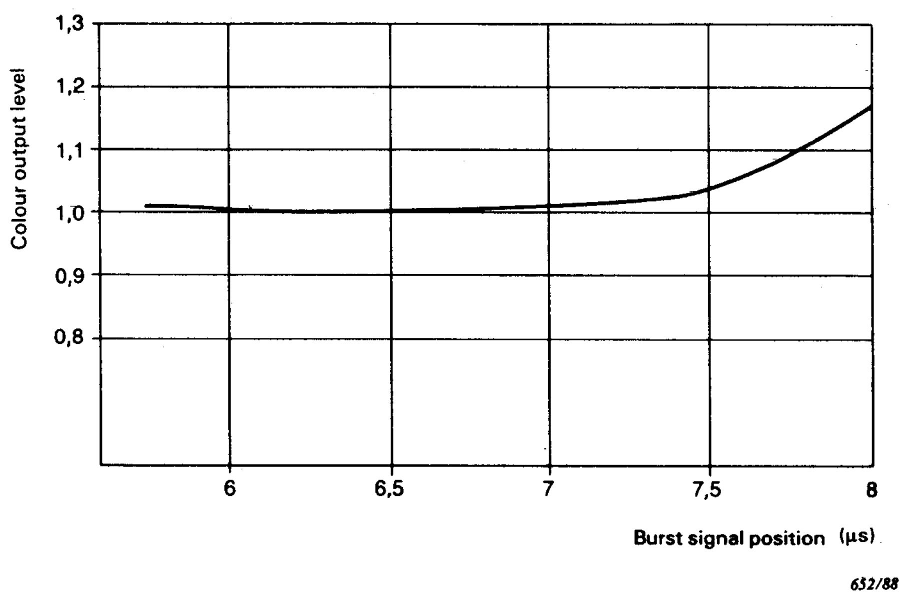


FIG. 40. — Colour output level vs. burst signal position (NTSC).

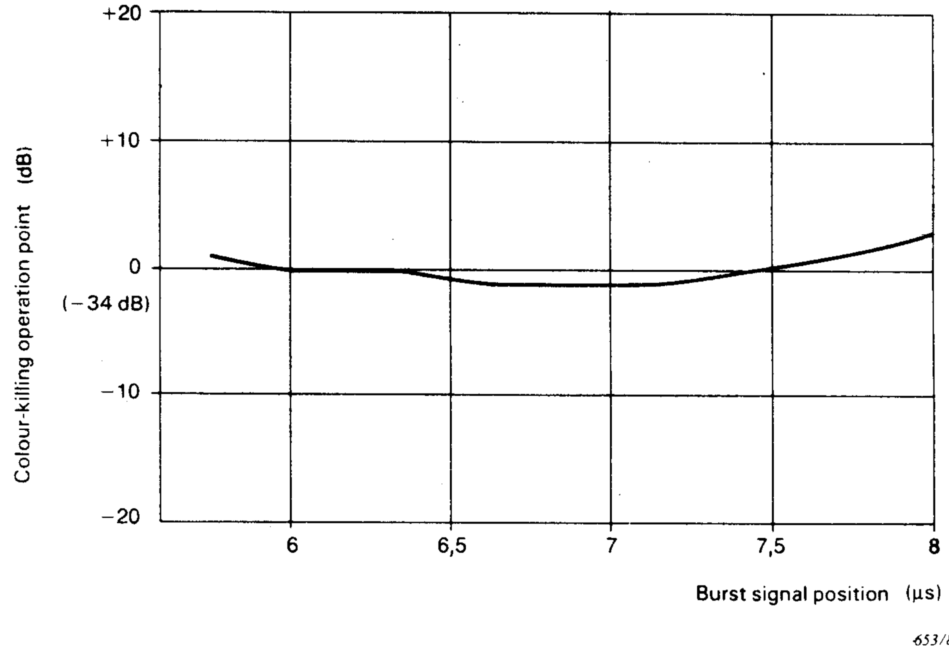


FIG. 41. — Colour-killing operation point vs. burst signal position (NTSC).

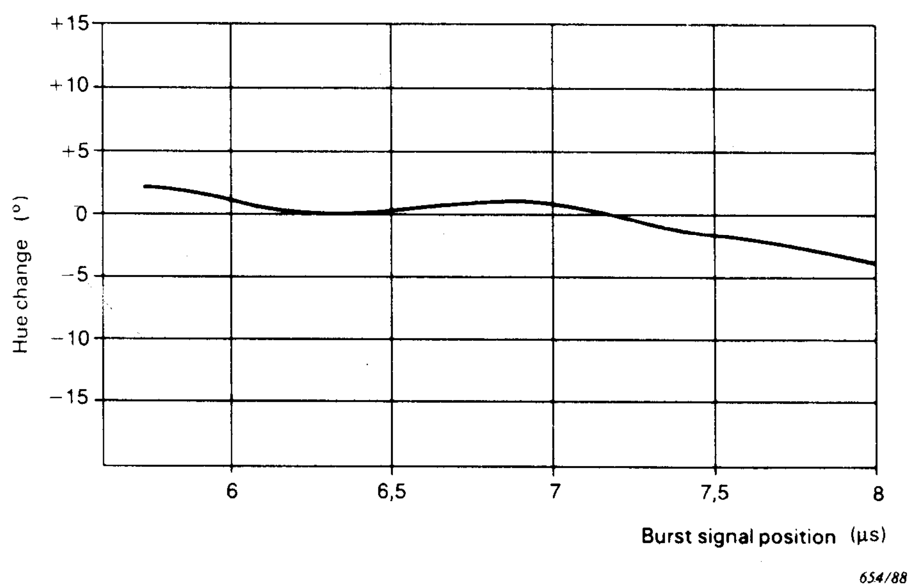


FIG. 42. — Hue change point vs. burst signal position (NTSC).

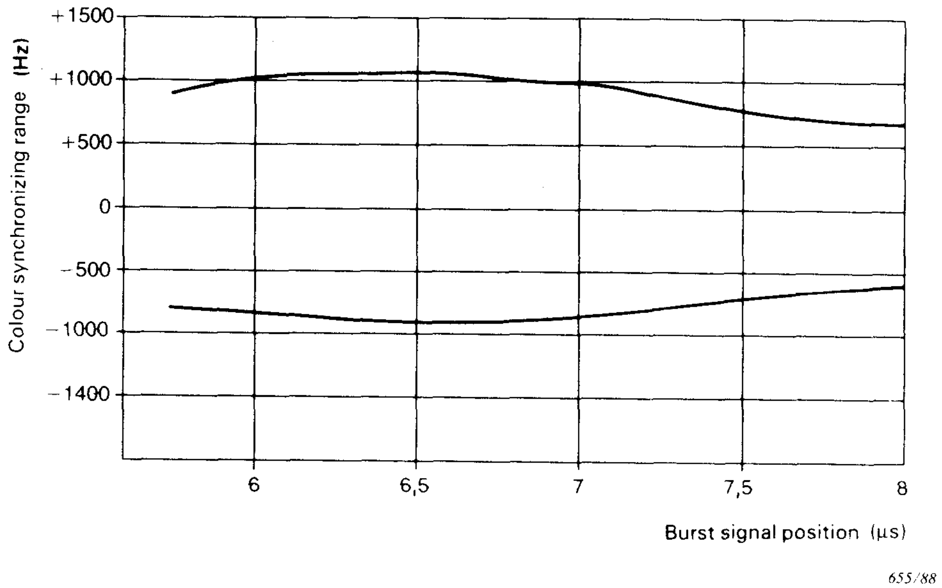
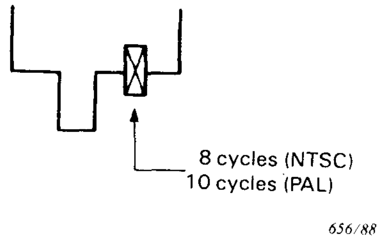
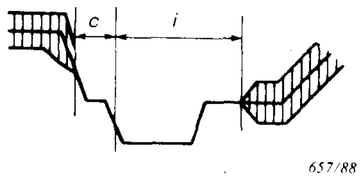


FIG. 43. — Colour synchronization range vs. burst signal position (NTSC).



a) NTSC and PAL systems



b) SECAM system

FIG. 44. — Details of line synchronizing signal.

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